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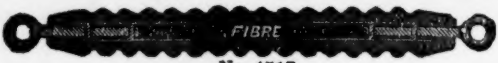

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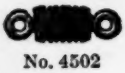

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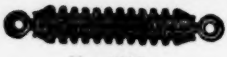

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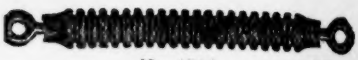

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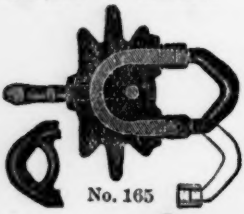

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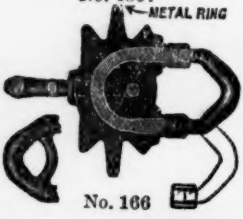

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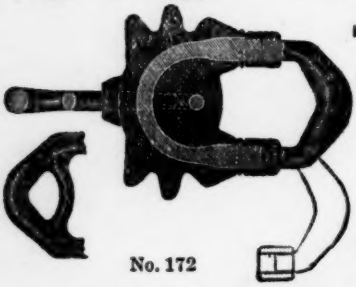

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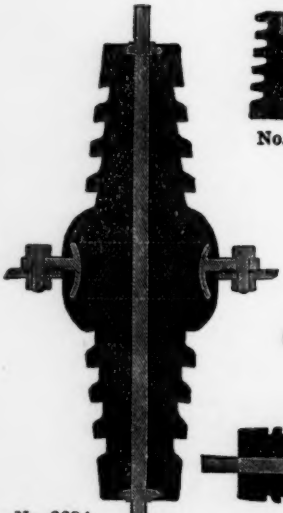

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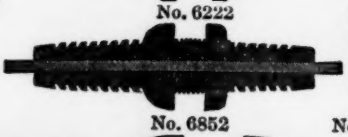

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THE AUXILIARY SQUADRON

By COMMANDER REGINALD R. BELKNAP, U. S. Navy

I

One principal purpose in forming an auxiliary squadron in the fleet is to relieve the commander-in-chief of the burden of logistics, so that he may devote his attention to tactics and strategy, uninterrupted by any but the large questions of administration which only he can decide. The success of such an organization is proportionate to the degree with which the admiral is relieved of matters which subordinates, cognizant of his general plans, can settle quite as well for all concerned as if decided by the admiral himself. To be effective, the auxiliary squadron should comprise all the elements and business which do not pertain directly to the military employment of the fleet, and also those necessary to sustain and prolong its military activity. By military employment and activity are meant the use of the fleet against an enemy, real or simulated, as distinguished from activities internal to the fleet, necessary to routine life and sustenance. In a word, the auxiliary squadron business has to do with supplies and facilities for maintaining the fleet's military powers.

The highest authority afloat has the gravest problems. He cannot delegate them, even if he would, for there is no other authority in a position to fulfil such a responsibility. Hence, unless the admiral be freed from distraction by minor matters, the larger

ones cannot receive the continuity of concentrated thought which alone brings out true proportion. The organization should be such, therefore, that the commander-in-chief can count upon the various subordinate commands fulfilling their parts in his scheme of employment, without his paternal—one might almost say maternal—care in their preparation. He should no more have to deal with their coaling, provisioning, and manning than a captain should be referred to every time an ordinary seaman needs a new white hat. At inspection and in the course of everyday duty a captain notes whether his division officers have cared for their men's being properly clad. So with the fleet units. The admiral, having assured himself that the fleet's requirements have been seasonably arranged for, need not attend to their serving out.

For some years past in the Atlantic fleet the commander-in-chief has not concerned himself with these details in person. Nevertheless, they have been arranged by his staff, thereby taking a considerable portion of the time and energy of the officers upon whom the commander-in-chief must depend for assistance in matters of supreme importance. The charge is, not that the commander-in-chief's staff *cannot* attend to these matters, but that other authority, of secondary degree, can do so equally well, and that if, instead, the commander-in-chief and his staff do this indispensable but secondary work, they thereby sacrifice undivided attention to their paramount responsibility. Everyday needs are tangible and insistent. Matters of large comprehension contain an element of distance and uncertainty. It is easy to yield to demands which by their immediateness seem large; and so it will ever be, until the fleet be so organized and administered that routine matters will not *tend* to intrude upon the serious and general.

While routine details should not burden the admiral, yet he must be in touch with the fleet's maintenance. This explains why these matters have so long been handled by his chief of staff. Whoever they be placed under must know the commander-in-chief's plans intimately and keep him informed of conditions and resources. The principle would be met in a way by dividing the admiral's staff into the military or planning branch and the maintenance branch. This appears to have been the original idea in having a personal staff and a fleet staff, though the principle was not logically followed out and the terms were inappropriate. The Germans provide a commander-in-chief with "admiral staff

officers," and also flag lieutenants, personal aids, and fleet officers—medical, engineer, pay, law, and chaplain. Their staff provision for the presence of a train is not known. Their present fleet bases directly on the great home military ports.

While the suggested division of the staff into two branches, military proper and maintenance, would work well, it would fall short of the desired end, in not relieving the commander-in-chief of some minor but continual distractions. Staff officers do not exercise military command and could not, therefore, relieve the admiral of certain administrative details, among them discipline. An auxiliary squadron commander and his staff, however, could take over all the fleet maintenance duties; and for disciplinary and other administration among the auxiliaries, their squadron commander would have the same command status as in other squadrons. While it may be that the amount of such business in the auxiliary squadron may be small now (though this is very doubtful), in time of war it would be much larger, and the need for prompt action imperative. The commander-in-chief could not attend to it then, certainly, and there would have to be a change of organization just when the smoothest unbroken working everywhere would be indispensable.

But whether the auxiliary business be small in amount or large, why should the commander-in-chief or his staff be burdened with it at all, needlessly? Gunnery, torpedoes, machinery, and athletics are all factors of the first order in naval efficiency, yet the commander-in-chief must leave even these almost entirely to the squadron commanders. He deals with squadrons as *finished products*, and to charge him with details of training and material preparation, or facilitate his mixing in them, is at once to divide responsibility with the squadron commanders, lessen their authority, and worst of all, lower their prestige and his own. Such a result is inevitable if the commander-in-chief retain duties in these connections for his own staff. How much more unsuitable for his staff then are the duties of the auxiliary squadron.

Other matters besides mere supplies and repairs can be taken by the auxiliary squadron, among them intercommunication throughout the anchorage, berthing and traffic, patrol on shore, and guard afloat. Matters of this kind are reducible to routine handling, being practically the same during every visit of the

fleet at the same anchorage, and at different anchorages varying only in minor details. A few examples may illustrate.

During a recent assemblage at Newport, with three battleship divisions, the torpedo flotilla, and a number of auxiliaries in harbor, four guard boats visited the senior flagships twice a day. The most distant guard boat would pass two other divisions on its way; the next, one other division; and all might have to wait a while off the flagship. Again, a dozen boats and working parties, from as many ships, would gather at Long Wharf twice a week or oftener, to receive freight shipments. An auxiliary squadron organized for the *main* purpose of efficient management of material supply could certainly arrange in both these instances with fewer boats and less mileage.

The functions of port captain being supposed vested in the auxiliary squadron commander, all incoming movement and shifting about would be governed by him, except of vessels belonging to other squadrons whose commanders were present. It is not vital, and seldom interesting, to the commander-in-chief or his staff to note matters of this kind. Where his various units may anchor can be indicated days or weeks in advance, or conform to a standing principle. As to occurrences in the anchorage, he need not be bothered. A case in point occurred recently. A collier got ashore and radioed for help. The chief of staff directed the auxiliary division to send a tug, later to lighter part of the cargo, and to report conditions, besides sending a staff officer to examine the situation. Now, with the auxiliary squadron established, its commander would be expected of his own motion to take complete charge in such a situation, whether the vessel ashore were a collier or a battleship. All tugs, lighters, repair ships, every facility, being under his immediate control, and he being a flag officer or senior captain, the commander-in-chief would be justified in having full confidence that all necessary action would be seasonably taken. At the outset the chief of staff would see that the commander-in-chief was informed that a vessel was ashore, imparting the news at a convenient time. In due time the report would come that the vessel was off, uninjured or with damage of so much, or that the situation was so and so, as the case might be. The auxiliary squadron commander would be in a position to investigate directly, and possibly in many cases this would avoid the delay of a preliminary board of investigation, permitting a court of inquiry or

even a court-martial to begin at once where culpability was evident, or the incident closed promptly without any proceedings, on this flag officer's experienced recommendation. But the main point is that the matter would at no time be on the commander-in-chief's mind, as something for him to attend to. Similarly, superior control over the shore patrol could be left to the auxiliary squadron commander; likewise, beach-master's duty, apportionment of athletic grounds, marking and police of race-boat courses, etc. These matters may not take much time of the commander-in-chief's staff, but why should they take any time of a body concerned with larger matters which no one else can handle? It rather detracts from the prestige of the superior staff to have such minor duties; and as long as such duties concern his staff, it is inevitable that they will come before the admiral, sooner or later, for decision. If for decision he must go deep into the matter, it will be an interruption of more important business. On the other hand, if his decision be virtually only to confirm his aid's recommendation, why should he be bothered with the matter at all?

The business of the auxiliary squadron commander may be indicated most clearly perhaps by an outline of the proposed distribution of business among all the staffs of the fleet, organized to include an auxiliary squadron. For this see the appended diagram. This distribution makes the auxiliary squadron commander in effect the logistic member of the commander-in-chief's staff, and gives him besides full executive authority and responsibility. He is like a navy yard commandant. Ships could apply to the auxiliary squadron for their wants directly, just as they do at a navy yard. A ship in company with the flagship at a navy yard does not apply to the flagship for coal, but directly to the yard. A commandant is responsible to the department; the auxiliary squadron commander, to the commander-in-chief. The auxiliary squadron commander, knowing the commander-in-chief's plans, would decide whether the wants of a ship or other unit should be filled in whole or only in a specified proportion, whether immediately or in turn, etc. Upon this decision, made on military grounds, the auxiliary squadron staff would act directly.

Or, suppose the fleet at Newport or Hampton Roads. A vessel applies for coal. The auxiliary squadron commander, controlling the supply afloat and having arranged with the local authorities, sends alongside a collier, or lighters from the naval station, which-

ever suits the commander-in-chief's general plans the better. The auxiliary squadron would never clash with local facilities. Its commander would utilize them, whether naval or commercial, to eke out those of the train or furnish what it could not, or to spare or replenish its stock, so that the train might move on complete, with the fleet.

The other staffs are freed of the business of *providing* material wants. Captains keep their immediate chiefs informed of their material states, but see to it themselves that they keep stocked and outfitted. Each chief places in the hands of the next higher chief a *finished product,* trained and ready for military use. In this way, unnecessary intermediaries are eliminated, and in responsibility and control, duplication, which means division, is avoided.

In the appended diagram, number of vessels in the various units are immaterial to this discussion. Whether there be 9, 8, or 16 in a battleship squadron, its commander's staff would need to have the same elements; and so whether a division be 3 or 4. Similarly, it is probable that the staffs of the torpedo and submarine flotillas may not be quite as their chiefs would recommend; but their basic principle is not different.

Elaborating somewhat on the auxiliary squadron staff's duties, the following parallel shows how direct and smooth would be the transition of the auxiliary squadron commander from the status of train commander to that of base commander, and vice versa.

THE AUXILIARY SQUADRON

AS THE FLEET TRAIN	AT THE BASE
TRAIN COMMANDER	BASE COMMANDER
Rear Admiral, with powers of a Commander-in-Chief within his command, afloat and ashore	
Chief of Staff	
Captain or Commander	
General direction and supervision	
Staff Business	
A. *Reports and Orders,* Lieut. Incoming and outgoing orders, instructions and reports.	A. Same as opposite.
B. *Material for Issue,* Pay Inspector.	B. *Material Control,* Pay Inspector.
Fuel, lubricants, water.	Same as opposite.
Ammunition.	
Provisions and clothing.	
General supplies and equipage.	

C. *Squadron Engineer Work,* Lieutenant Commander.	C. *Machinery Repair Control,* Lieutenant Commander.
CH. *Hull Work,* Naval Constructor.	CH. *Hull Work,* Naval Constructor.
D. *Tactical Control,* Commander or Lieutenant Commander. Movements, formations for steaming, defence, and anchoring; station keeping.	D. *Port Captain,* Commander or Lieutenant Commander. Mobile local defence, harbor control.
E. *Communication and Intelligence,* Lieutenant. Signals, radio, etc.	E. *Communication and Intelligence,* Lieutenant, Marine Officer, Army Officer.
F. *Disciplinary Affairs,* Commander or Lieutenant Commander (may be retired).	F. *Disciplinary Affairs.* Same as opposite.
G. *Sanitation,* Medical Inspector.	G. *Sanitation,* Medical Inspector.
H. *Miscellaneous Inspections, Examinations, etc.,* Lieutenant Commander.	H. *Important Miscellany,* Lieutenant Commander.
K. *Troop Affairs,* Major, M. C.	K. *Shore Defences,* Major, M. C.

This topic has been gone into at some length in a paper on "Outlines of a Proposed Base Organization, and Proposed Train Staff Organization," which is of interest in connection with the present paper. It was founded on experience at the Naval Base at Key West in 1898.[1]

The auxiliary squadron would be composed of all base defence and auxiliary vessels, including supply, fuel, ammunition, hospital and repair ships, transports, tugs, and other craft not intended for regular employment in the active offensive away from the base. There has been some question as to the suitability of mining vessels belonging to the auxiliary squadron. In the writer's opinion they should be there, since their employment is primarily at or near the base, and because they include some vessels, as tugs and small mine-layers and sweepers, which would be in constant demand, and for a large part of the time available, for non-mining duties (picket, patrol, transportation), within and near the base. Such of them as might be capable of operating at a distance could do so when required merely by being assigned as a detachment, joined for the occasion to some other command.

As a flagship for the auxiliary commander, there should be a separate vessel. It would not be suitable, either at the base or in the train, for the commander to be in a vessel of special type. The

[1] Article by same writer on "The Naval Base at Key West in 1898," published in PROCEEDINGS U. S. NAVAL INSTITUTE, No. 159, September–October, 1915.

squadron commander's function is military command and administration of a military supply and auxiliary force. His prestige should not be prejudiced by appearances; and his flagship should not be subject to loading or discharging cargo or other material requirements that might block, interrupt, or retard the whole base or train administration, or displace its seat. Further, there is no probability that any special type would have the requisite complement, in character, ability, or number. Demands on the flagship's officers for work outside the ship would be incessant, making probably half of them informal attachés to the base commander's staff. It was so in Key West in 1898, where the volume of business was trifling compared to that of a train and base of to-day, while the anchorage area there was very small, and the auxiliary vessels few.

The flagship must have radio operators, signalmen, and yeomen, fully competent and ample in number. The business transacted would ordinarily be large; in war, voluminous. It would affect every ship in the fleet and have to be done with dispatch and *without errors* or confusion. There must be many boat crews in constant use. The ship herself must be fit to steam somewhat better than the rest of the train, and to fight her own armament with effect. Her crew should be known men, because a base and train could leak much information. A little malicious forethought here could start something disastrously. A ship as well trained as any in the fleet is requisite. Her condition would be a strong direct influence for good or bad throughout the whole train or base. Would it work for good, if the flagship were *thrown together*, on the outbreak of war?

An older cruiser or, preferably, battleship would be suitable, such as the *Illinois* or *Chicago*. With the train at sea there should always be armed vessels, and such a flagship, together with the mining vessels, all of them armed, would fulfil this requirement. At the base, the flagship's armament would be a material addition to the local defence against the possibility of a raid. There may be objection to appointing such a flagship at a time when officers and men are short in every employment. But such a shortage is really an additional reason, a very strong one, in favor of such a flagship now. As a general rule, strength in the battle line is the first consideration; but this principle degenerates to a fetish when the fleet is out of symmetry. The vitality of any body lacking several essential organs is most precarious. As exemplified in a recent

strategic maneuver, and well known long before that, a fleet that is blind, short in reach, and inferior in speed, is wofully handicapped; and even were such defects removed, the lack of reliable steady sustenance means inability to get a second wind. Bringing a battleship to efficiency is the most familiar task in the navy, but do we know all that we should about a train? An inexperienced train organization will impair the value of every fighting unit. So, if, to keep one more battleship in full commission, the requisite train organization is suppressed, the result in war efficiency will be a painful disillusionment.

The train at sea must be under a commander of its own in war, else the military commanders would be hampered in their measures to protect it. The first step would be to appoint a commander. At a base, permanent or temporary, the base commander must be independent and have full powers over his command, else he will be unable to get the most out of the facilities at his disposal. That a train or base commander's business will of itself, without actual trial and practice during peace, develop smoothness in administration is not to be expected. Even radical defects sometimes do not reveal themselves short of actual trial. Better administration throughout the fleet, in economizing commonplace effort to the advantage of fighting efficiency, and the necessity for thorough preparation in the vital matter in war of supply and maintenance, demand that delay continue no longer in establishing the fleet organization *altogether* as it should be for war, and putting into practice the training and development of that branch on which the fleet's staying power will depend.

II

Assume an auxiliary squadron established, the cognizance of supply affairs thereby taken away from an authority too preoccupied otherwise and placed with one able to devote to it his undivided attention. The whole administration of the fleet would benefit by this release from a cumbersome system or, rather, lack of responsible system. The military quality of the combatant elements, both singly and in combination, could not fail to improve. But this would be only half the gain. Improvement in combatant qualities means increased *power*. To this, the better organization of supply adds increased *mobility*. This is the second great reason for organizing an auxiliary squadron.

The mobility of a naval force is perfect *for a time;* but the period is limited; and the ability to lengthen that portion of it which is devoted to activity against the enemy, and correspondingly reduce the unproductive portion consumed in recuperation, is the measure of efficient logistics in the theater of operations. The aim should be to render military activity continuous, not intermittent. Continuity of naval supply calls for well developed arrangements, fully prepared in advance.

Logistics has been well defined as "the feeding, marching, and resting of troops in the field in the best order and in security." In naval application this becomes, "the supplying, moving, and refitting of the fleet in the best order and security." The auxiliary squadron's principal concern is supply and refitting; but it has much to do also with the security of the base in the absence of the fleet, with moving its own vessels in security, and with its ability to perform all its own functions in the best order; that is, to contribute its utmost to the mobility of the fleet. With an auxiliary squadron below par, the power of the fleet would be cut in half.

For a naval force of given strength, the logistic requirements for war vary according to the location of the principal theater of operations. The elements influencing such variation are:

(a) the distance of the theater of operations from the home coasts;

(b) the possession of secure advanced bases;

(c) the availability of positions suitable for advanced bases;

(d) the direction and distance of sources of supply;

(e) the material resources of the belligerent's own country;

(f) the number and location of available lines of communication; and

(g) the degree of preparation existing during peace.

The elements of the enemy's logistics also influence our own to a certain extent, because his facility or difficulty of operating calls for greater or less effort to overcome him. The influence of enemy logistics thus bears first on our strategy, and so they affect our own logistics, indirectly it is true, but still surely. It is not pertinent here to discuss all these elements; but some of them bear directly upon the need to have a complete auxiliary squadron, well organizd in itself and well established in its place in the fleet, before war becomes imminent.

Distance imposes a fourfold disadvantage; first, in expense, which is a factor of increasing weight as the complexity of modern warfare progresses. At the same time, since distance prolongs the duration of operations, the higher expense drains the national endurance, as well as the resources more peculiarly military. Then there are increased uncertainty and lengthened exposure, which may be regarded as the normal and the military risks of extended distance. They magnify the initial expense as well as the current, and add considerably to the military burden of guarding communications. Efficiency in the train and base administration, whereby the maximum possible is realized among all resources, operates directly to reduce this fourfold burden.

Secure bases advanced towards the theater of operations diminish the handicap of great distance from the home coast. This applies with greater force when the home coast does not afford military facilities uniformly over its entire extent. At the present time, we still lack a first-class continental base on the Pacific; and while we possess Pearl Harbor and appreciate its vital importance both offensively and defensively, it is not yet fully equipped. A permanent advanced base that is secure, and has ample repair and docking facilities as well as supplies, is second in value only to the principal continental base. Its distance from the continent is almost an entire saving out of the total distance towards the theater of operations. The transportation costs remain and some exposure, in degree dependent on relative situation and saliency. Uncertainties and time are saved largely, especially time for combatant ships, which means a great military gain. With the growth in our country of strictness in neutral observances, the availability of situations for bases diminishes, making the establishment of permanent adequate positions in time of peace more and more imperative.

The possession, or the lack, of suitable bases determines whether the first naval operations of war shall be offensive or defensive. From a salient base already in possession, the fleet may at once, by an active course, prevent or neutralize the gain which would otherwise accrue to the enemy through delay on our part. Even were the fleet at a distance, there would still be advantage, in our fleet's freedom to proceed unencumbered by a train. When, however, the fleet is under the necessity of seizing a base, there is first delay until the convoy is complete, and then the expedition has to proceed

at a low speed. It is tactically encumbered seriously, both by the presence of its convoy and by the fact of being on the defensive; and finally, even if the base be acquired without opposition, the fleet, after such an effort, is liable, in its first encounter with the enemy—an occasion of the highest importance—to be not at its best but rather in a worn material condition.

The most damaging result of having no base is the necessity for starting the war with the defensive attitude. With the quick wit and enterprise of our people, reasonable preparedness would give us a tremendous advantage. These same qualities, however, if not rightly employed—possible only through due preparation—taking ebullient form, would force an outlet in hasty, ill-considered action, leading to disaster. If the government be unable, or neglects, to make those principal preparations during peace which possible wars demand, we cannot expect that same government to have the power, in the early excitement of war, to conform the popular will to the careful procedure which, with initial *unpreparedness,* offers the only prospect of success.

Discussing the foresight which aims to acquire and equip during peace the positions needed for support in war, Mahan writes of "the inevitable tendency, the necessity, to proceed to the gradual acquisition of permanent bases as soon as national policy impels a navy to a new scene of activity." He names communications the "living connection with the national power." "Communications dominate war." Daring and robust vigor mark the activities sustained through a sound artery. When the life channel is precarious they show the grip of invalidism. Like other forms of human activity, this "living connection" will not spring into being full-grown. Such a course should be taken in peace as will enable a fleet to pursue the strong policy in war.

In extension of the saliency of permanent bases, advanced, temporary, or flying bases may be needed, according to the direction and character which the operations may take. The existence or absence of suitable places may determine the intended operations. Where a force may be sustained and refreshed in close proximity to its appointed station, the admiral may press vigorously some bold operation which would be impossible even to attempt from a distant base. Togo could not have watched Port Arthur so effectively from Wei-Hai-Wei or Chemulpo as from the

Elliott Islands; nor would San Nicolas Mole or Nipe Bay have been equally effective for us against Santiago.

It can hardly be expected, however, that the United States will for some years to come possess in time of peace secure positions for use as naval bases at all the points that our naval effort may require for support of the national policies. Even were it probable that we had them at the principal points, there would still be other places where at some time in the campaign temporary occupancy might be necessary. For probable campaigns away from our continental coast we need extreme mobility of our naval force. This comes back with increased emphasis on the auxiliaries supporting the fleet. To quote Mahan again, "a fleet charged with the care of its base is a fleet by so far weakened for effective action—weakened both strategically and tactically." Conversely, a fleet like ours, whose probable employment demands that it be peculiarly unhampered strategically and tactically, must have bases wherever it needs them, and these to be dependable must be capable of taking care of themselves. The advance base force and outfit, therefore, if it is to be strong for its own defence as well as capable of rapid establishment in a new place, must be up to its work in all respects, to the degree that only well thought out preparation and thoroughly practiced organization can produce.

Certain preparations require large expenditures and outside sanction. The establishment of suitable bases falls under this head. But whether the bases be completed or not, and wherever they may be placed, there will always be large transport and supply requirements, and these should be thoroughly organized and arranged for now. Much of this can be done with small expenditure and without further authorization than already exists in law.

War organization might be divided into three main branches: (1) the permanent naval force, including the serviceable fleet and auxiliaries as they stand on the navy list in peace; (2) the auxiliary naval force, embracing the vessels of all kinds necessary to acquire for naval commission in war, in augmentation of the permanent force and for troop transportation; and (3) supply. Our existing naval administrative organization takes account of the first and the third—how effectively as a whole for a state of war is not a question for this paper. The organization of permanent auxiliaries into a squadron is the principal recommendation here. The second branch, comprising supplementary auxiliaries and troop transport,

has not yet been adequately provided for, and it is in this direction also that great improvement could be made.

One step would place all sea transportation under the navy. Unless this be done there will be duplications, omissions, unaccountability, conflict of authority, weakness of control, inefficiency of material, and wasteful expenditure, besides the high initial expense due to having two branches of the government go into the ship market at the same time. This step would necessarily involve the interworking of the army and navy in transport matters, which can be provided for by the permanent association of one or more officers of the army general staff and quartermaster department with the naval transport organization.

The naval auxiliary and transport service administration should be under the division of operations, with no other function than to maintain preparation for complete or partial mobilization of the auxiliary naval force and sea transport. Already we have, in the navy yards, the branch hydrographic offices, the custom houses and the naval pay offices at all principal ports, the means necessary for the actual inspection, purchase, equipment, and supply of vessels and material. Before this point is reached a large amount of business is to be done in general arrangements; and in making these a careful study of coastal rail and sea traffic is necessary, in order to make sure that in taking over American vessels interior communication is not disorganized just at the time when its burden would become heaviest. The naval authorities need to keep in close touch with railroad and steamboat officials, therefore, as well as with foreign going shipping. In a paper on the 1911 army mobilization on the Mexican frontier, General Tasker H. Bliss commented on the railway transportation difficulties and delays. We are accustomed to count upon rapid and prompt movement of men and material within our own borders as a matter of course; but, as General Bliss points out, the actuality presents many difficulties. Accidents, bad weather, excursion crowds, etc., are frequent disturbers of railroad schedules in times of ordinary quiet. In war, with movements of large numbers and quantities, mostly in one general direction, the congestion is liable to be serious. Hence, in planning for the days of mobilization, when normal economic conditions will already be suffering, smoothness of administration, private and public, is very important; and unless our plans avoid all unnecessary disturbance of normal commercial transport, we help defeat our own ends.

Another most important measure necessary to insure reliability of logistics in war is the establishment in peace of a naval reserve, of adequate enrollment and training of the merchant marine and ex-naval men. The merchant marine taken into service will be largely employed in duty with the train and bases. Some naval experience for them before the outbreak of war would be an obvious advantage. Here lies a large field for the auxiliary squadron.

The general preparation for war during peace comprehends all branches of the art of war; but unless the degree of preparation is uniform in all branches, deficiency in one impairs the others also. In a healthy body, symmetry is requisite not alone in organism but also in development. Lack of symmetry in preparation leads to improvisation, to supply deficiencies. Improvised means, whether men or material, lack the trained character and tested reliability of the regular. And not only is it they that are less efficient. The commander fated to use them is hampered, through inability to gauge their real capabilities—anxious not to entrust them with too much, yet unwilling to utilize less than the full value which such means *ought* to represent. Makeshifts in military measures have long been our curse.

The postponement of logistic preparation until war begins adds great expense outright, by reason of many purchases being made under pressure. No experience shows that more clearly than ours in the Spanish war. But it does not stop there; for with high cost for poor material goes a restricted market. With preparation completed in advance, every advantage is open, especially when salient bases are adequately equipped. In such a situation, a navy could pass from a state of peace to one of war almost imperceptibly, and against an equal or less prepared power be initially so strong and commandingly placed as to dominate the opening campaign if not the entire war, or even to prevent a war's outbreak altogether.

The well-ordered arrangements of a campaign begin during peace, and unless largely completed before war becomes imminent will lack the tested adjustment which marks the difference between well considered plans and hastily improvised expedients. Test and adjustment are fundamental principles of sound naval practice, so that it is inconceivable that we should wittingly neglect any preparation for the conduct of war which is in our power to make.

Initial advantage in preparation tends to secure the initial success. In the froth of popular discussion of our military affairs, hardly yet crystallized into a policy, the probability of initial disaster has by many been lightly accepted, in the confidence of ultimate success; but, aside from the inhumanity of thus courting waste of life which might be spared, history teaches that few causes so fortify the numerically weaker contestant as initial success, which thorough preparedness may make possible to him.

In policy, no deliberation would be complete that did not take into account the logistic magnitude of any conflict liable to evolve. In major strategy, appreciation of the logistic problems of both sides is necessary to sound conclusions. In strategy of the theater of operations, a belligerent's own logistics determine his attitude, and limit the freedom, the reach, the force, the duration, and above all the confidence, with which he can act. Finally, in the strategy which merges directly into the tactics of battle, the efficiency of the logistics that have brought the forces to the fighting situation will be a large factor in the admiral's calculation. Superior physical and material condition count more than numbers. They have never existed with poor administration. Morale may occasionally surmount bad management, but only by supreme effort and excessive cost in life, too great to be prolonged. The only sure way to possess sound morale is to organize and work for it. Its basis is mutual confidence between superior and subordinate. Well-ordered arrangements not only produce sound physical and material condition, but instil that superior spirit and confidence which unite effort and intensify its power.

ATLANT

COMMANDER-IN-CH

Chief of Staff .....
Navigation .....
Tactics .....
Intelligence .....
Instructions (Secretary) .....
Communication (Signal, Radio, e
Marine Affairs .....
Personal Aids .....

1ST SQUADRON

9 or 8 Battleships

Vice Admiral

Chief of Staff ..... Flagship's Captain
Tactics and Personnel... Lieut. Commander
Gunnery ..... Lieut. Commander
Machinery ..... Lieut. Commander
Hulls ..... Naval Constructor
Torpedoes ..... Lieutenant
Signals and Radio ..... Lieutenant
Sanitation ..... Medical Inspector
Personal Aid ..... Lieutenant (J. G.)

2D SQUADRON

Same as 1st Squadron

3D SQUADRON

Battle Cruisers

Rear Admiral or Vice Admiral according to number

Staff as for 1st Squadron

A SQUADRON WHEN IN RESERVE

Same as 1st Squadron

but under a Rear Admiral

CRUISER SQUADRON

Cruisers, Large and Small

Rear Admiral

Staff

Same as 1st Squadron, plus
Supply ..... Pay Inspect
Marines' Affairs ..... Major M. C.

When the number grows to allow cr
near the Main Body, form a 2d C
Squadron

DIVISIONS "A," "B," "C"

3 or 4 Battleships

Squadron Commander commands Division "A"

Divisions "B" and "C" commanded by Rear Admirals

Staff ..... Flagship's Captain
Gunnery and Tactics .... Lieut. Commander
Secretary and Aid ..... Lieutenant

DIVISIONS "M," "N," "O," "P"

Commanders and Staffs as when in active service

but with

Captains in place of Rear Admirals

1ST, 2D, 3D, ETC., CRUISER DIVISI

Squadron Commander commands t
1st Div.

Others by Rear Admirals or Captains, with same Staffs as Division "B"

Smaller vessels usually acting singly come directly under Squadron Commander or S. O. P.

NTIC FLEET

N-CHIEF	ADMIRAL	ORDER OF POWERS
.....	Captain	
.....	Flagship's Captain	
.....	Commander	
.....	Lieut. Commander	
.....	Lieut. Commander	
dio, etc.)	Lieutenant	
.....	Major of Marines	Supreme
.....	2 Lieutenants	

ON	DESTROYER SQUADRON	SUBMARINE SQUADRON	AUXILIARY SQUADRON	Powers of a Commander-in-Chief within own command
all	All destroyers, their tenders, and scouts as flagships Rear Admiral Staff Same as 1st Squadron, plus Mines.... Lieut. Commander	All submarines, their tenders, and older cruisers as flagships Rear Admiral Staff same as for Destroyer Squadron, plus Electricity....Lieut. Commander	Base Defense and Auxiliary Vessels Flagship, an Older Battleship or Cruiser Rear Admiral Chief of Staff .....Flagship's Captain Reports and Orders ....Lieutenant Material for Issue .....Pay Inspector Machinery .....Lieut. Commander Hulls .....Naval Constructor Tactical Control .....Lieut. Commander Communication .....Lieutenant Discipline (Courts) ....Lieut. Commander Sanitation .....Medical Inspector Miscellaneous .....Lieut. Commander Shore Defences .....Major M. C.	
plus spector M. C. ow cruisers 2d Cruiser				

VISIONS	1ST FLOTILLA	EACH FLOTILLA'S ORGANIZATION	MINE DIVISION		Tactical powers; other powers as delegated by Squadron Commander; powers of a Commander-in-Chief when S. O. P.
nds the or s as cting ler or	3 Destroyer Groups Flotilla Flagship (Scout) and a Tender Rear Admiral is also Squadron Commander 2D AND OTHER FLOTILLAS Captains in Command Staff .....Flagship's Captain Tactics and Adm'n .....Lieutenant Torpedoes .....Lieutenant Machinery .....Lieutenant Radio and Signals .....Lieutenant	Similar to that in Destroyer Squadron	Mining Vessels Mine Sweepers Tugs Captain Staff 2 Lieutenants		
	Each group consists of 6 or 5 destroyers, corresponding to present divisions. Senior destroyer commander, a Lieut. Commander, commands the group; has an extra Lieutenant as Aid		Mining Group Sweeping Group Tug Group	SUPPLY AND REPAIR GROUPS Fuel Ships Supply Ships Repair Ships Ammunition Ships Hospital Ships Transports	Tactical

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE ENLISTED MAN'S ANNAPOLIS

By Civil Engineer Leonard M. Cox, U. S. Navy

It requires very little consideration to foresee that one of the greatest difficulties to be overcome in preparing this nation for the possibility of war with a first-class power is, not the unwillingness of Congress to provide the necessary ways and means, but the reluctance of the young men who make the armies and navies to enlist in a service where they are subjected to restraining discipline, where the work is sometimes hard and monotonous, and in which the hope of advancement is comparatively small.

Ours is not a military nation. We are not a military people by inclination. The army and navy offer certain attractions to the boy of adventurous age, it is true, but the time of one enlistment spent in learning a trade or clerking in a grocery store would give him a material asset in the form of marketable experience, and the majority of young Americans are quick to see and decide upon the more advantageous course. If they do enlist, through the love of travel and adventure or the glamour of gilt buttons, they do so with the mental reservation that they are not committing themselves to a life career. They may serve one term and go to work; they may even serve two; but the percentage of the entire personnel which is satisfied with one is great, and the time and money spent in training is surely a doubtful investment if service ends just as the point of maximum usefulness is attained.

Recruiting literature, and its multi-colored posters picturing gunnery sergeants delivering important dispatches to major generals in full regalia, or brass-bound admirals smiling benignly on signal boys flashing fleet formations from the bridge, set forth many very real advantages of a military career. One feels instinctively, however, that these advantages are for the boy who would rather clean out McGillicuddy's alley with the gang than help in father's store with the Saturday night's rush. Somehow

one does not make mental pictures of the steady, plodding, serious, "bound to succeed" young man, standing before the recruiting officer—I mean the kind who begins at 16 to plan a career of constant climbing and whose every effort is bent upon turning his plan into a reality. The serious boy has no time to fritter away in seeing the world, has eyes for naught which will not advance him. He will be among the first to volunteer in case of actual war, but in times of peace his mind runs to statesmen's faces on five dollar bills—not to clipper built ladies tattooed on his corn-fed muscles.

Now, in what has been said thus far, there is no intention of reflecting upon our splendid body of *professional* enlisted men, if I may use that term in referring to those who are in the service because they are born for the service, who make the service a life career. No finer body of men exists than these; and I would like to go on record as one who is proud of them. This class is and must be, however, a very small part of the fighting army or navy. The great majority might be termed "floaters." They enlist in a mood; serve in apathy; and muster out in delight; yet, to a great extent, they constitute the nation's defence. It is to reduce the proportion of this element in the service, and to attract the youth of the country who are really worth while, that these ideas are submitted for consideration.

The desirable youth shuns the service because he is seeking a career which will compensate him for a life's work, and he cannot afford to gratify a passion for excitement. He is patriotic to the bone; nevertheless, and what is more to our interests, he has an eye for a trade. He is no more impressed with the gaudy lithographs of the recruiting office than he is by the "Hands Wanted" placard of a mine camp railroad, yet he would seriously consider either the work train or the "Queen's shilling" if he could see an adequate *quid pro quo* set forth in contractural black and white. If he could receive, in return for his service, not merely board and clothes and liberty money, but a something which would stay with him all his life, and which would add to his ultimate earning power, his capacity for enjoyment, and his social standing in his community, it would soon become necessary to establish waiting lists at receiving stations, no matter what increases in "authorized strength" Congress may decree.

If the services are to be increased in time of peace, men are necessary; not *mere* men, but the *best of men;* men of ambition, of aspirations, of latent ability. *If* men are necessary, and if they won't come voluntarily, they must be *induced* to come. If, then, compulsory service is eliminated from consideration as contrary to the genius of our government, but one solution of the problem remains and that consists in offering such a compensation as will draw them. Based upon a more or less continuous study of this subject for the past nine years, I am convinced that one thing, and one thing only, will furnish the necessary compensation—and that is *Education.*

The present administration of the Navy Department has anticipated the key-note of my plan in its announced policy of educating the enlisted man; but nothing in the carrying out of this policy has so far provided the full measure of "attraction" which is demanded, if the promised waiting list is to be a thing of reality. Without the least intention of criticizing the department, or its agents, I may be permitted to go further and state my belief that there is much in the methods as adopted which militates against the proper training of the men for their naval duties; and which, to a certain class of men at least, is distasteful and irritating, in that it deprives them of the right of option as to whether its advantages be accepted or declined.

An education may be said to bring enjoyment and profit to its possessor in three ways: first, by enlarging one's mental equipment and fitting him for the greater achievements of life; second, by the prestige he gains thereby in the eyes of his associates; third, by the satisfaction derived from the knowledge that he possessed the ability and perseverance to acquire it. The first is a great and real enjoyment, but one which none may share and none but its possessor may actually see. A man may attain this enjoyment from self education and a bright man may profit marvelously by an unfinished course in an unknown school. The second is visibly represented by the diploma or degree conferred upon him when actually graduated from a sanctioned institution, and by the material worth of the reputation accruing to him through the standing of the particular school which granted the diploma. The third is a secret, but no less real, enjoyment, depending also upon the standard and standing of the school attended. Maturity values the first of these pleasures and ignores the others. Unques-

tionably maturity is right; but to youth, it is the sheepskin with his name engrossed upon it that lures, it is the fact that he is known to the world as an Annapolis man, a Yale man, a Rensselaer man, a West Pointer, that makes him stick through four long years of grind while the business world, the tradesman's bench, the outdoor world of sport, is calling him.

There are to-day, many thousands of young men for whom government educations are impossible and who do not possess the means for a college or technical course. They are ambitious; they are earnest; they feel that they have the capacity. What would these men not give, were they able, for a course in the institution of their choice? Many do achieve educations, but at the price of self-sacrifice and hardships. Many wait on tables, clerk in stores, canvass for book publishers, drive automobiles, in order to pay tuition and keep body and soul together throughout the long terms. Assuming a school of really high standard which would make the offer, is it to be doubted that they would serve eight years for the coveted education, if given good food, clean quarters, healthy work and a physical training for the like of which their rich cousins pay Muldoon $60 a week?

As a matter of fact an enormous number of these young men are forced to compromise with their ambitions by resorting to that typically American invention, the correspondence school. A correspondence school is an institution whose principal function is the publishing of advertising matter of a kind which is calculated to make a bread-line veteran sign up for a lifetime of monthly installments. One runs an eye down the list of remunerative professions, as set forth in their circulars, sticks a pin in civil engineering, naval architecture, marine engineering, trained nursing or mid-wifery, sends in his first installment and begins. The first paper is on the addition table, and the student swells with pride over the ease with which he disposes of it—and he pays the second installment. The second paper expounds the subtraction table and the result is a third payment. Everything is satisfactory until the student reaches cube root, when the average man lays down on the whole proposition, defaults in his payments, counts up his losses—and finds he is out a tidy sum for his experience. I say the average student, but, in justice to the best of such schools, I should state that the instruction papers are usually well written and cover the ground in a thorough and easily understood manner, so

that, given a young man with ability, exceptional perseverance and will power, it is quite possible not only that he will graduate but that he will acquire about as much real education as the average student of a regular technical school.

From such information of shipboard conditions as a "shore-going" staff officer is able to gather, it seems that quite a large percentage of our enlisted men are enrolled—or were, prior to the recent introduction of common school classes aboard ship—in one or another of the prominent correspondence schools. Pay officers have stated that many men allot their tuition installments from their pay; and from the same source it appears that many allow their scholarships to lapse and never finish the course. The amount of money thus lost by men who, through incapacity, want of will power, or lack of the proper personal assistance, become discouraged and give up in despair, is very probably in excess of the sums paid in by men who actually graduate and receive the anticipated returns.

In order to acquire information concerning the methods employed by correspondence schools, I have enrolled as a student in three different institutions; receiving instruction papers, sending in answers and solutions, and writing special inquiries on the blanks furnished for "matters not understood." From this experience, I would say that the great defects of the scheme are the lack of incentive; the lack of personal contact with instructors; and lack of the competitive spirit resulting from actual association with fellow students. These defects may, in an organization such as the navy, be largely eliminated.

In brief then, I would propose the inauguration of a NAVY TECHNICAL SCHOOL. As a first step, let a faculty be appointed, with headquarters in Washington, and let this faculty prepare instruction pamphlets for courses in the various technical professions or specialties—patterned after the best private correspondence school practice. Let the courses be so devised as to give a thorough grounding in elemental work, and possibly some advanced work, during the period of the first enlistment; and to enable the student to complete the prescribed course during the second enlistment. If, after a searching examination, a student satisfies all requirements of the elementary course, let him receive, upon the expiration of his first enlistment, a parchment *Proficiency Certificate*, NAVY TECHNICAL SCHOOL. Upon the comple-

tion of his second enlistment, if he has passed satisfactorily all prescribed tests, let him receive a regular diploma with the degree of Bachelor of Science in his chosen specialty.

Enrollment in the school should be entirely optional. Each recruit should be allowed to select his course and matriculate immediately upon enlisting; he should be given a copy of the school regulations and have explained to him the circumstances under which the privilege of scholarship may be forfeited. Each student should be allowed to wear a suitable "student" rating mark, and should be otherwise encouraged to develop school and class pride.

The plan of instruction should be a combination of the ordinary school and correspondence methods, worked out along some such lines as the following: Upon enrollment, papers No. 1 and No. 2 are forwarded to the student from the school headquarters. Each paper to be divided into two parts—text and examination questions. After reading the text once for a preliminary understanding, the student begins a thorough study, topic by topic, working all problems and retaining his notes to be turned in when the subject is completed. Should he fail to understand any part of the text or any problem, he will bring same to the officer assigned as his "prefect" at the designated "school hour" and ask and receive elucidation, as hereafter explained. When he feels that he has mastered the subject-matter of the paper, he will, without his books or other aid, reply to the examination questions and forward same to the faculty in Washington. Examination answers for Paper No. 1 will be marked promptly by the faculty and returned to the student by mail. If the marks are satisfactory he is furnished with Paper No. 3, having been engaged in the meantime on Paper No. 2. In this way he is always provided with work and there is no delay. Each subject would necessarily involve a number of so-called papers, and upon the satisfactory completion of all the "paper" examinations he may call for a "final" examination on the entire subject. The final examination is held under the supervision of his prefect, with questions and problems furnished by the faculty under confidential seal. When a student has passed a subject examination he is given a "pass slip" counting on his course for a diploma or certificate.

It will be seen that, were the scheme to end here, it would result in a vast improvement over the ordinary correspondence methods, in that difficult points are explained by a visible instructor and not

by written communications, and that examination questions are not known beforehand and examinations are held under the preceptor's eye. The advantages of the navy school, however, should be far greater than these. On each ship and at each yard there are machines of various descriptions, engines, motors, steam and electric generators, piping and wiring systems, machine tools and an assortment of apparatus that would make the reputation of many so-called technical schools. In addition there are at the more important yards certain trade schools such as, the Artificers School at Norfolk, the Electrical Class at New York, school for machinist mates, etc., which might, with slight modifications of plan, be operated as branches or adjuncts of the parent school for the entire service. Students should, when reaching the proper point in their courses, be given opportunities to familiarize themselves with machines and their theories, and, so far as may be practicable, should be assigned to trade schools upon application. Commissioned and chief warrant officers should, when practicable, deliver lectures on pertinent subjects and otherwise assist in every way possible. When a student is at work on such a paper as "Direct Current Machinery" for instance, he should have the privilege of asking his preceptor for special instruction; and the preceptor should comply by requesting the detail of a junior officer from the engineer division to give a demonstration of the ship's auxiliary machinery. In addition, students should, whenever possible be detailed to duties affording opportunities for the particular kind of experience calculated to assist them in their courses.

There should be regularly detailed for preceptor's duty, one or more junior officers of the yard or ship, depending upon the number of enrolled students in the command. To these officers there should be assigned a definite number of students, and they should keep themselves advised as to the progress and needs of each student under them. Each preceptor should hold "school hour" at a designated time each day, or on such days as he may find necessary or expedient. At these school hours, students should be permitted to ask questions bearing upon the papers being studied and to receive such help as the preceptor deems advisable.

Many ways for enhancing the value of the courses, not touched upon above, will undoubtedly suggest themselves when the task of working out details is seriously undertaken by trained educators

in cooperation with experienced line officers. Since I am neither the one nor the other, I have only attempted the merest suggestive outline; yet I would not leave the question of details without a further word concerning incentive. It is believed that the necessarily close association of students on any one ship, taking the same course, will prove a great incentive to earnest effort. This will be aided by the proper use of rating marks and, possibly, by distinctive class marks, as well as by the practice of encouraging clubs, class associations, etc.

The incentive to enlist will grow with the popularity and prestige of the school. The best way to popularize the school is by making the offered education intrinsically valuable, and this may only be accomplished by the best of faculty talent and by zeal and ability on the part of its organizers. If the education furnished be good, the school will in time acquire a reputation—but, nevertheless, the slow processes of time should be anticipated by advertising. To this end I make the further suggestion that the student graduating highest in each year be commissioned as ensign and the one graduating second be commissioned second lieutenant of marines; all other graduates to be given preferential designations for examinations to fill vacancies in the pay corps.

At first glance it may appear that the adoption of this plan would result in transforming the battleship into a floating university. This may be its effect, and if so the plan should be relegated to the waste basket. I confess to a profound ignorance of all the multifarious duties of Jack afloat, and yet, as a land-lubber whose full days leave him a fair allowance of leisure time for the evening papers, and a little study or social relaxation, I cannot help thinking that the enlisted man who is so inclined could manage likewise. As to the time of officers required for instruction duty, proper organization and management should make this even less of an encroachment upon legitimate duties than it now is. However this may be, the workings of the plan on shipboard is a matter on which sea-going officers must pass, and final judgment should be withheld until efforts have been made to eliminate objectionable features. The scheme may not prove practicable; it may be discarded because of interference with the performance of military duties; it may be deemed inexpedient; I may even be wrong in assuming that it would be popular with the present enlisted force. Frankly, I do not know. I merely present the idea for what it

may be worth. It is born of an intense interest in all that affects the good of the service, an interest which surely calls for no apology from any patriotic citizen.

If, on the other hand, the plan be deemed practicable and it be put into execution; if, for the period of service covered by two enlistments, there be offered a government education even remotely comparable to that obtainable at the two national academies, with the splendid physical training in addition, the general public would soon know of it and value it, and it would mean something in the world to be a graduate of the *Enlisted Man's Annapolis*. The poor boys' education problem would be solved and it would become necessary to turn away applicants from the recruiting office doors.

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PROJECTILES CONTAINING EXPLOSIVES

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The idea of employing powerful explosives as interior charges for projectiles dates from the discovery of gun cotton by Schönbein. On the appearance of this substance its explosive power and its insolubility in water immediately attracted the attention of the military services of the different countries to it. Up to then black powder only furnished the interior charges for shells and bombs.

In France the Pyroxylin Commission, presided over by the Duke de Montpensier, carried out numerous tests for the purpose of determining the practicability of this material, but repeated explosions, in the bore, of projectiles charged with gun cotton caused the abandonment of these researches.

It was not until 1886, following the work of Turpin on the priming of picric acid, that the question of charging projectiles with high explosives was taken up again in France, and this led to definite results.

I. STATE OF THE QUESTION

The number of explosive substances which have been prepared up to the present time is very considerable. However, in spite of the fact that many of them are employed in the industries, only a very small number of them can be utilized in charging projectiles. Such use is subject to imperative conditions which markedly limit the domain from which one may select an explosive for artillery.

A projectile exerts destructive effects on an obstacle either because of the kinetic energy which it possesses at the moment it strikes upon it or because of the energy liberated by the detonation of the interior charge of explosive which it carries. Finally, and

if the obstacle is very resistant (such for example as plates of armor protecting the sides of ships), experience shows that the effect produced by the detonation of a charge exploded in contact is, in general, insufficient to cause the rupture of the obstacle. This cannot be accomplished except by the passage of the projectile itself through the armor plate. If it is sought to sweep away obstructions, the potential energy of the explosive charge carried by the projectile should be exercised at this point.

Inasmuch as a charge of explosive cannot be projected to a great distance without its being enclosed in a highly resistant metallic envelope,[1] it follows that in practice they will always produce simultaneously the destructive effects of the characters considered above. Finally, one may consider the destruction of the personnel as a principal purpose in the employment of shells charged with an explosive. In this case one will seek to effect the rupture of the body of the shell into a large number of fragments animated with the highest possible initial velocity. In addition are the notable destructive effects produced by the shock of the explosion wave on the persons who are in close proximity to the center of explosion. It is evident that endeavors will be made to produce the one or the other of these effects.

§1. CHARACTERISTICS OF EXPLOSIVES

In order to secure the results of the study we propose it is expedient to study these in detail. We recall at the outset certain elementary views concerning the characteristics essential to explosives.

In this regard an explosive is theoretically defined by certain data the chief of which are its force, F, its potential, Q, and its rate of detonation. The force is represented by the following expression

$$F = \frac{p_0 V_0 T}{273}$$

in which p_0 represents the atmospheric pressure (which is 1.033 kilos. per cm.^{2}), V the volume, in liters at 0° C and 760 mm. of pressure, of the gaseous products resulting from the explosion of one kilogram of the explosive, and T the absolute temperature of the explosion.

[1] It will be otherwise if it be attempted to project the explosive charge by means of rockets analogous to the old-fashioned war rocket.

The potential, Q, represents the work corresponding to the indefinite expansion of the above mass of gas. If E designates the mechanical equivalent of heat and q_0 the heat liberated by the explosion then

$$Q = Eq_0.$$

The rate of detonation is that of the propagation of the phenomenon of explosion in traveling through a lead or tin tube filled with the explosive under consideration.

Finally, the definition of an explosive from the point of view under consideration is completed by a knowledge of its aptitude for detonation which is evidenced by its sensitiveness to the blow of a hammer of given mass (20 to 30 kilos.) falling from a determined height, or by its sensitiveness to detonation by a detonator containing a given weight of mercury fulminate.

The following table gives the values for the force and potential pertaining to commonly occurring explosives:

	F	Q Ton Meters
(1) Gunpowder	3,250	270
(2) Mercury fulminate	5,020	173
(3) Ammonium nitrate	5,100	267
(4) Ammonium picrate	7,940	323
(5) Picric acid	9,010	250
(6) Cellulose endecanitrate (gun cotton)	10,230	457
(7) Cellulose octonitrate (collodion cotton)	8,360	313
(8) Nitroglycerin	10,560	669

It may be said concerning the velocity of detonation that it attains its maximum value with crystalline bodies such as picric acid and nitromannite where it is of the order of 7000 meters per second and falls to about 2500 meters in liquid and plastic substances such as nitroglycerin and dynamite.

If we designate by Δ the value of the ratio $\bar{\omega}/C$ where $\bar{\omega}$ represents the weight of explosive contained in volume C and α the covolume[2] of the mass of gas produced in the explosion (that is to say the volume limit occupied by this gas under an infinite pressure), Noble and Abel have shown that the pressure, P (in kilos. per cm.^{2}), developed under these conditions on the walls of a receptacle G was defined by the formula

$$P = \frac{f\Delta}{1 - \alpha\Delta} \quad \frac{f}{\frac{1}{\Delta} - \alpha}.$$

[2] Sarrau has shown that the value of α is for all gases very nearly $V/1000$.

When the density of loading Δ becomes equal or superior to $1/\alpha$, the denominator of P becomes zero, and the pressure is infinite. Resistant as the envelope containing the explosive may be it is then ruptured and the debris projected.

The interior of a projectile being supposedly filled with the explosive constituting the charge if its specific gravity is greater than $1/\alpha$ the preceding conditions are evidently fulfilled.

Noble and Abel's formula supposes implicitly that the composition of the gaseous products, and as a consequence the covolume of the entire mass, remain invariable whatever the pressure is. As a fact it is not so in most cases because of the operation of the principle of the displacement of the equilibrium. In virtue of this principle the increase of the pressure of the mass of gas causes, when the change is possible, the formation of more and more condensed compounds and, in consequence, the diminution of the covolume.

It follows that the limit value of $1/\Delta$ can be such that it will always remain less than α. Hence the pressure cannot become infinite. This is the case for gun cotton.

The increase in the proportion of the condensed products is, on the other hand, generally explained by the correlative augmentation of the quantity of heat disengaged, q_0, and of the temperature, T, of the explosion. The force will then increase with the density of the charge. This is that which takes place in the case of picric acid.

From the standpoint of variations in the phenomena of detonation it may be said generally that the ability of an explosive to effect the rupture of its envelope is above all determined by an elevated value for its force and for its rate of detonation. Its destructive effect is chiefly a function of the magnitude of its heat, q, or *per contra* of its potential.

§2. EFFECTS OF THE DETONATION OF EXPLOSIVES

This summary of the theoretical views being disposed of we take up the description of the effects of detonation. We will suppose at the outset that the explosive is subjected to detonation in free air or when contained in a feebly resistant envelope. On explosion the gaseous mass which is produced expands in the direction of least resistance, that is to say from below upwards. This projection of the gas is accompanied with a violent aspiration of the layers of air in the vicinity of the ground, which

aspiration is indicated by a brusque depression of the barometer whose intensity diminishes rapidly as the distance from the explosion center increases. Under the influence of this depression the air confined in nearby enclosures tends to escape outwards and projects in that direction weakly resistant sides such as doors, windows, roofs and the like. The effect appears much as if a charge had been exploded within the enclosure.

Under the action of this movement of masses of air animated with a high horizontal velocity the layers near the periphery of the gaseous mass produced by the explosion, and which are animated with a vertical movement acquire at times a most complete vortex motion. At the same time that this gaseous flow, which is often in a vertical direction, is set up, the detonation engenders a shock wave whose velocity of propagation is at first much greater than that of sound, but which rapidly diminishes until it becomes the same as sound. There is thus produced an interruption of continuity and we know that in this case the difference in pressure existing at the front of the wave and the medium in which the latter is propagated may attain to a very notable value.

Numerous researches have been made on this subject in France and elsewhere. The more recent have been carried out by the Commission on Explosives[3] which has recognized that the limiting radius, r, of dangerous effects by the wave could be represented by the formula

$$r = K\sqrt{C}$$

in which r represents a length expressed in meters, C the weight of the charge in kilos., and K a constant dependent on the nature of the explosive and the degree of security sought. It follows from this that for different charges the distances at which corresponding mechanical effects are produced are proportional to the square roots of the weights of the charges.

The detonation of 100 kilos. of melinite, for example, gave rise to a shock wave at whose surface there existed a pressure greater than 10 kilos. per cm.^{2} for a distance of 7 meters about the center of explosion. At 10 meters the pressure was between 2 and 3 kilos., and at 15 meters it had fallen to less than $\frac{1}{2}$ kilo. Regarding the velocity of propagation of this wave we find it to have been 800

[3] Memorial des Poudres et Salpêtres, 1905-1906. Étude des effets à distance des explosions. M. Lheure, rapporteur.

meters per second in the vicinity of the center of explosion, 635 meters at 5 meters farther away, 360 meters at a distance of 50 meters, and then down to 250 meters per second which is the velocity of sound.

It follows from the preceding that a person located at some meters from the explosive charge will first be struck by the pressure from the shock wave which will be followed by a sharp and sudden depression and movement of the air at high velocity towards the center of the explosion.

A fortuitous circumstance, recorded by M. Arnoux, has enabled us quite recently to elucidate the order of magnitude of this depression and to explain by the same the probable mechanism in numerous cases of dead bearing no apparent wounds which have been observed on the battlefield.

Last January M. Arnoux received from a superior officer at the front a pocket aneroid barometer which had been put out of service by the explosion of a German shell at a distance of about three meters from the instrument. On examination its parts were found intact but it could not register because that the two transmission levers connected with the indicating needle no longer rested on the other lever but had passed below. It was immediately apparent that this condition could have been caused only by an abnormal dilatation of the aneroid system due to a considerable barometric depression. Under these circumstances the instrument had registered a pressure much below the minimum pressure inscribed on its graduated arc.

After having put the two levers in place the instrument was placed under the bell of an air pump and exposed to the vacuum. It was found that the two levers changed positions when the pressure on the interior had fallen to 410 mm. of mercury. It was concluded that the explosion of the shell produced in its vicinity a static depression of $760-410=350$ mm. of mercury.

From the aerodynamic formulas it appears that the immediate production of this depression will give birth to a wind having a velocity of 276 meters per second and which will produce a dynamic pressure of 10,360 kilos. per m.^{2} on a plane surface normal to the direction of its propagation.

Such a rush of air would overturn and crush to earth persons exposed to it. Those escaping would nevertheless suffer from the brusque depression, reckoned above, which would follow. Owing

to this the air and carbon dioxide dissolved in the blood will be immediately set free in small bubbles, and, if their diameters are larger than those of the small arteries, they will form gaseous plugs which will instantly arrest the circulation of the blood in these arteries and death will occur before the re-solution in the blood on the restoration of the pressure to normal.

The passage of the sound wave at the outset of its formation can also rupture the ear-drum, but its duration is extremely brief as compared with that of the following depression.

In all of the foregoing there has been only the single question of the mechanical effects due to the passage of the explosive from the solid to the gaseous state. The occurrences of the war have thrown light on the pathological rôle which the gases produced or liberated in detonation have come to play. Without wishing to enter on the study of projectiles designed for asphyxiation of the enemy we may remark that most of the nitro-explosives employed in charging shell disengage notable proportions of carbon monoxide. Although the toxic power of this gas is relatively great it may be observed here that it is not freed except when the explosion occurs out of contact with the air. This will, for example, be the case where a projectile is buried and exploded in the earth or a shell is exploded in a habitation of small size. In all other cases the carbon monoxide is immediately burned by the oxygen of the air in such manner that in reality only carbon dioxide is observed. It is known that man can continue to live in an atmosphere containing a very large proportion of this latter gas.

Let us now examine the nature of the phenomena produced by the rupture of the metallic envelope constituting the body of the shell.

Different cases are distinguished according as to whether the body consists of cast iron or of steel. In the first case the metal is as it were pulverized by the explosive. The metallic powder produced by the explosion is projected with a great velocity; but, as the mass of the pieces is extremely small they rapidly lose their velocity; in fact they have no efficiency after a course of a few meters.

By reducing the ratio of the weight of the charge to that of the projectile one can, it is true, somewhat improve the fragmentation. They cannot, however, obtain a satisfactory result except by reducing the weight of the charge to such an extent that

the effects of the blast and the momentum of the fragments become in themselves insufficient.

In addition to secure the necessary conditions of safety the walls of the cast iron shell must be thicker than those of the steel shell, from which it results that the former is inferior to the latter from all points of view.

The rupture of the steel envelope is effected from the beginning in a totally different manner from cast iron. If the body of the shell is thin it is torn into strips of relatively light weight.

The destructive effect from the action of the gas on loose soil manifests itself in the production of a cavity having the form of an elongated elipsoid whose longer axis will be perpendicular to the horizontal projection of the trajectory. The differences in length of the two axes diminishes, other things being equal, the greater the depth to which the projectile has penetrated the ground before its explosion.

When the walls of the projectile are thicker the fragmentation changes in character and they note the production, in place of the preceding chamfer strips, of fragments of irregular form, the average weight of which increases with the ratio of the weight of the projectile to that of its charge. For a given projectile the size of the pieces furnished by any part of it vary with the thickness of the walls at that point. The velocity of these pieces naturally varies inversely as their weights. This may be measured with the wire screens and the chronographs. The results obtained will be but average indications and often will be very inexact on account of the fact that the wires of the screen targets are sometimes broken by the shock wave before they can be cut by the fragments. Accepting this necessary condition it has been observed that the velocity of the fragments reaches and may surpass 1200 meters per second when using a shell with thin walls.

The fragments of the ogival and base will be thrown with less velocity but nevertheless they will have a velocity greater than the residual velocity of the projectile.

II. ARRANGEMENTS OF THE EXPLOSIVE PROJECTILE

The arrangement and proportioning of the parts of the explosive containing projectile determine the functions it is to play. It may be required for the demolition and dispersion of weak defences situated close at hand, and then thin walled projectiles carrying

large charges of explosives would be made use of and as their resistance to the effects in firing is not great they would be discharged under low pressures.

In order to augment their range and penetration they would be fired at high angles near to or greater than 45°. It is advantageous to use for this short caliber pieces such as obuses or mortars.

If it is desired to produce destructive effects at great distances the weight of the projectile and consequently the caliber will be increased. In case of unusually great distances, such as 20 kilometers or more, quite long cannon and high initial velocities must be employed. These guns are fired under high pressures and it is necessary to reënforce the walls of the projectiles to an equal caliber and reduce the interior explosive charge.

The considerations of a general nature relative to shell having been treated of, it remains to discuss those relative to the choosing of the explosive and the fixing of the charge.

§1. CONDITIONS OF LOADING

Industrial explosives are generally used in cartridges or sticks which are placed in bore holes in the interior of the material that is to be blown up. They are not therefore exposed to any violence.

The explosive charge of a shell must on the contrary endure the forces of inertia, translation and rotation due to accelerations originating in the chamber of the piece.

For the purpose of showing the magnitude of these forces we will take as an example the shell of a cannon of 75. This projectile is subjected during firing to a maximum acceleration of the order of 200,000 meters per second. Its ratio to g (acceleration due to its weight) being about 20,000, it results that the particular material contained in the shell develops at the moment of firing under inertia an effect directed towards the base of the shell equal to about 20,000 times its weight.

The height of the shell cavity occupied by the charge being on the average about 20 cm. it follows, if we designate the specific gravity of the explosive by δ, that the pressure in kilos. per cm.^{2} exerted by the charge on the base of the projectile is equal to $\frac{20 \times \delta \times 20{,}000}{1000}$ which is 400δ. Taking δ as equal to 1.5 it results that the effort tending to crush the column of explosive as the projectile starts from rest proceeds in increasing progression from

the point towards the base where in contact with the latter it amounts to 600 kilos. per cm.^{2}

On the other hand under the influence of the rifling the projectile acquires a motion of rotation whose maximum velocity at the instant of leaving the bore is about 300 revolutions per second, and this angular velocity coresponds to a circumferential velocity of the inside walls of about 50 meters per second.

These figures show the magnitude of the forces to which the explosive material of the charge is subjected depending on the duration of the blow from the cannon. It by this becomes obvious that a powerful explosive which has been used on a large scale in the mining industry and in rock work is nevertheless unfit for use in charging projectiles. However, we now know the precise conditions that an artillery explosive must satisfy.

Regarding these characteristics the most important is that the force and rate of detonation shall be as large as possible. It has been observed that this last requirement implies the use of crystalline substances; but it should be stated that the realization of this desideratum is notwithstanding secondary since experience has shown that a satisfactory detonation can be obtained with plastic substances if a detonator capable of imparting a sufficiently high velocity is used.

In order to ensure safety in firing, the explosive should be capable of resisting the effects of inertia which are developed i the chamber of the piece. If it be a solid, and this is generally the case, it should be absolutely compact in structure and should adhere strongly to the walls of the shell.

The meeting of this last condition is necessary in order to prevent the friction of the charge resulting from a difference in speed of rotation between the shell and its explosive due to the inertia of the latter. The compactness of loading tends to prevent compression and shock on the interior of the explosive mass following the travel of the projectile through the bore. The adhesion of the explosive to the walls of the shell can be determined at the outset by following the method used in loading cartridges in which the explosive, instead of being placed directly in the cavity in the shell, is first enveloped in thin sheet metal or card board, and thus surrounded is introduced into the chamber of the shell after the walls have been coated with a layer of vaseline or paraffin. If the interior of the cartridge is firmly partitioned off by resistant dia-

phragms, these will also tend to protect the charge from the friction due to its inertia to rotation. The use of a simple cartridge in metal or card board appears to be advisable in all cases, but particularly for base loading shells of large capacity.

It is possible to build up the charge by the aid of several separate cartridges and by this means avoid the difficulties encountered in seeking to obtain, through fusion, a long column of perfectly homogeneous explosive. In all cases this rids one of the serious inconvenience which results from the fused explosive running into the space between the projectile and its base plug. It also prevents dust from the explosive getting into the threads of the plug or into the fuse device.

If the explosive be formed by mixing a solid and a liquid these will be found evidently the best conditions from the point of view of safety, since under these circumstances abnormal heating of an isolated point will be much less likely to occur and all friction of solid on solid will be avoided. But on the other hand another inconvenience presents itself; viz., J, the acceleration of translation to which the charge is subjected at the instant the projectile starts on its travel of the bore. It follows as a result of this acceleration that the difference between the apparent specific gravities of the solid and liquid components of the explosive is multiplied by J. There is then shown a tendency of the explosive to separate into its two components, following the axis of the projectile, at the moment of departure from the gun. In order for such an explosive to be acceptable it is necessary that the difference in the specific gravities of its components shall be as small as possible.

One may theoretically consider the use of liquid explosives such as Sprengel's (dinitrobenzene and nitric acid, $F=9949$) or one of the panclastites of Turpin (nitrobenzene and hyponitrous acid; $F=10{,}860$; naphthalene and hyponitrous acid; $F=11{,}700$). In this case the question of safety on departure appears completely assured; but the intimate mixing of the components of the mixture will be not effected unless they are miscible.

§2. PRINCIPAL EXPLOSIVES UTILIZED

As a rule, up to the present, only those solid explosives composed of nitrated derivatives of the aromatic series have been used

as charges for artillery projectiles.[4] It is expedient now to study the properties of those bodies that are utilized to-day, which are picric acid, trinitrocresol, trinitrotoluene, trinitronaphthalene and the mixture of ammonium nitrate and dinitronaphthalene known as Favier's explosive. There will be added also some bodies of the same series which appear susceptible of use but of which we have no example.

1. *Picric Acid.*—Picric acid or trinitrophenol (*melinite, lyddite, schimose*) occurs in small yellow crystals which possess a strong coloring power. It is but slightly soluble in water at ordinary temperatures, but this solubility increases as the temperature is raised. It is readily soluble in acetone. Melinite is fused at about 122° C. Its reactions are acid and it forms with metals (save tin) crystalline salts of marked color. Speaking generally the picrates are markedly explosive and they are the more unstable the heavier the metal which enters into their constitution. Lead picrate is especially dangerous. Iron picrate is much less so and its explosion in use cannot occur if the explosive is moist. In order to prevent its formation the walls of the projectiles are so varnished or coated with plating as to prevent their direct contact with the explosive.

It follows that because of the dangerous character of the lead picrate the tin used with which to coat the walls of the shell should be extremely pure. The care to be taken in avoiding in the course of charging the production of picrates is of the first importance and it is not to be overlooked as a factor in deciding against picric acid in comparison with those which follow it.

Picric acid may be detonated in several ways. That detonation of it which is called "complete" is characterized by the production of dense black fumes holding free carbon in suspension in them. In the detonation styled "incomplete" the explosion gases have a greenish-yellow color and at the same time they deposit a layer of undecomposed explosive on the surrounding objects. The energy set free in the complete is greater than in the incomplete detonation.

[4] The Austrian artillery appear to have tentatively used the mixture of ammonium nitrate and aluminum known as *ammonal*, but the sensitiveness to percussion and friction of explosives having an Al base appears to have led to its discontinuance.

The reactions attending these two methods of detonation are approximately as follows:

Complete detonation $2C_6H_2(NO_2)_3OH \rightarrow 8CO + 3CO_2 + 3H_2 + 3N_2 + C.$
Incomplete detonation $2C_6H_2(NO_2)_3OH \rightarrow 11CO + CO_2 + H_2O + 2H_2 + 3N_2.$

It is evident that in the case of a reaction effected by detonation in an extremely resistant envelope the consideration of the products will, in virtue of the displacement of the equilibrium, give principally those shown in the first equation.

Admitting there is obtained under an infinite pressure the maximum condensation represented by the equation

$$4C_6H_2(NO_2)_3OH \rightarrow 14CO_2 + 3CH_4 + 7C$$

the corresponding potential equals 573^{Tm} which is much in excess of that characterizing the first reaction given above. These reactions correspond in effect to the following:

Complete Detonation	Incomplete Detonation
$V_0 = 328$ liters	877 liters
$t = 2832°$ C.	2634° C.
$F = 9780$	9682
$d = 0.837$	0.877
Potential $= 371^{Tm}$	323^{Tm}

The velocity of detonation of cores of melinite enclosed in lead or tin envelopes is about 7000 meters per second. Dautriche, with very powerful primers, has obtained a velocity of 7645 meters per second.

Although the properties of fused picric acid were known before the time of Turpin yet it is to this inventor we owe its utilization as a military explosive. Turpin has devised that form and disposition of detonator which has ensured its complete detonation. His process consists essentially in causing the mercury fulminate detonator to act on pulverulent picric acid. The detonation of this last brings about the detonation of the fused explosive.

We have seen that the strong adhesion of the charge of explosive to the walls of the projectile is an essential condition to security in firing. From this standpoint melinite is above all most satisfactory. It is estimated that more than 20 kilos. per cm.^{2} of effort is necessary to effect the separation of a mass of melinite from the metallic walls to which it has been fused. This adhesion appears to increase markedly for some days after fusion. It is always greater than the cohesion of the explosive.

The fusing of the explosive in order to run it into the projectile is generally effected in a water bath which is a thermosyphon. Since melinite increases in volume at the moment of solidification experience shows that, as a consequence, cavities may be formed in the interior of the charge of the projectiles. Practice has supplied suggestions by which this serious defect may be overcome. An essential precaution consists in preventing the presence of the melinite in the thread of the nose fuse. Its presence on the outside of the fuse or in its threads may cause a premature explosion.

Picric acid is obtained by nitrating phenol. To obtain a uniform product the crystalline phenol should fuse at 39° C. This substance is obtained in the distillation, between 150° and 200° C., of gas tar. It can be obtained synthetically through the oxidation of benzene, the series of operations being as follows: The benzene is treated at first with concentrated sulphuric acid. Milk of lime is added in excess to neutralize the acid. The solution is then treated with sodium carbonate to form the sodium-benzene-sulphonate ($NaSO_3C_6H_5$). This is evaporated to a syrup with addition of soda and fused, when sodium phenolate is formed which is decomposed with sulphuric acid to set the phenol (carbolic acid) free, which is separated by ether and purified by distillation.

This purified phenol is treated with 66° B. sulphuric acid and then with 37° B. nitric acid. The picric acid formed is purified by repeatedly washing it with water and draining.

2. *Trinitrotoluene* (*tolite, trotyl*). This body appears in the form of small pale yellow crystals which fuse about 81°. Though insoluble in water it is very soluble in benzene and toluene.

While melinite reacts markedly, acid trinitrotoluene is completely neutral. It does not therefore act upon the metals in which it is put. It is more agreeable than melinite to handle since its dust is not irritating. It is less sensitive to shock but is also a little less powerful than picric acid ($F=8680$). When fused it adheres strongly to the walls of the vessel in which it is contained. But tolite presents the disadvantage of "piping" markedly at the moment of solidification. Its rate of detonation is about 10 per cent less than that of picric acid.

Tolite is usually prepared by trinitrating toluene directly with a concentrated sulphuric-nitric acid mixture. The reaction begins at 40° and ends at 105°; it being heated from 5 to 6 hours.

Tolite is primed in the same manner as melinite, but it detonate violently in the open air under the influence of a mercury fulminate detonator only. It is employed in the manufacture of cordeaux detonants by enclosing in lead tubes. It is the explosive most commonly employed by the Germans in charging their projectiles.

3. *Nitrocresols* (*cresylites or cresylol commercial*). Cresol is a product of tar distillation which is obtained between 185° and 210°. It is a mixture of three isomers, the proportions of which are very variable. Cresol is nitrated just as phenol is but the trinitrocresol only is used, and this is really the trinitrometacresol which possesses properties analogous to those of picric acid. It is a yellow substance which in all regards is more disagreeable to handle than picric acid, for its dust is more irritating and its vapors more suffocating. Its process of manufacture is similar to that of picric acid.

As an explosive it is a little less powerful than melinite. This is easily understood when we recall that it contains a large excess of carbon and hydrogen and that its combustion is consequently less complete. Mixed with pure melinite in the proportions of 60 per cent trinitrocresol to 40 per cent picric acid, there is obtained the explosive known in France as cresylite 60/40. This mixture, which is obtained by fusion under water, melts at about 85°, but at 65° it is sufficiently plastic to permit of its being compressed into charges which, on cooling, are compact, amorphous, and very homogeneous. Charges are thus obtained which are free from piping. It is this valuable property which justifies the use of the nitrocresols in charging projectiles.

In spite of the fact that cresylite 60/40 has less force (8380) than picric acid, its rate of detonation (7485 meters per second) is practically the same as the latter.

Like the trinitrophenol the trinitrocresol has an acid function. It forms salts analogous to the picrates and these are explosive. The ammonium cresylate only is sufficiently insensitive to shock to permit of its military use. In Austria it has been used in charging shell under the name of *ecrasite* and its power, though inferior to that of melinite or cresylite, is superior to that of dynamite No. 1.

4. *Trinitronaphthalene or naphtite* ($C_{10}H_5(NO_2)_3$).—Trinitronaphthalene is a clear yellow substance which is only slightly soluble in water, but is soluble in acetic acid and chloroform. Its sensitiveness to shock is very much less than that of melinite but

it requires a very powerful detonator with which to effect its detonation. When ignited it burns, without explosion, with a smoky flame, and it resists the shock of impact of small arm projectiles.

It is prepared by nitrating the mononitro or dinitronaphthalenes as a mixture of three isomeric trinitronaphthalenes which fuse about 110°.

At present naphtite is but little used as shell charges because of the difficulty of detonating it as mentioned above. It, however, is a powerful explosive, which, exploded in a bomb under the density of loading of $\Delta = 0.3$, gives a pressure of 3275 kilos. per cm.^{2}.

5. *Favier explosives and schneiderite.*—The Favier explosives have an ammonium nitrate base to which a slightly nitrated hydrocarbon (which is therefore but slightly explosive) is added. The ammonium nitrate itself being an explosive which is quite insensitive, the mixture obtained is remarkably insensitive, but its ignition temperature is relatively quite low. This union of properties explains its employment in coal mines as a safety explosive. The mixture of ammonium nitrate 90 per cent with mononitronaphthalene 10 per cent, constitutes *schneiderite* employed at Creusot for filling shell. It is a powerful explosive which is characterized by a force of 8400 units and a potential of 415 T-meters. Its normal rate of detonation, as determined by M. Dautriche, was 3585 meters per second for the pulverulent explosive.

It has been said above that Favier explosives are but very slightly sensitive to shock and thus schneiderite has been found to resist the impact of a projectile or the blow from a very heavy weight and, when placed on the rail, a cartridge of this substance was not exploded by the passage of a train. These properties imply the necessity of using a very powerful detonator with which to provoke its detonation.

6. *Benzite* ($C_6H_3(NO_2)_3$).—Benzite or trinitrobenzene is a white crystalline body which, when pure, fuses at 121°-122°. Although as powerful as melinite [5] it is very much less sensitive to shock than the latter. Moreover, it does not attack metals and, when compressed, it acquires a density of 1.67. Finally its rate of detonation, of the order of 7000 meters per second, is equal to that of picric acid.

[5] According to M. Dautriche the power of benzite is 5 per cent greater than that of picric acid.

Trinitrobenzene is an extremely interesting body because of its various properties. Unfortunately its price is so high as to limit its use. Thus far it has not been employed except to lower the melting point and increase the plasticity of tolite.

It is prepared by oxidizing trinitrotoluene with potassium dichromate in sulphuric acid solution by which trinitrobenzoic acid is formed and this on treatment with boiling water splits off the CO_2 group yielding the trinitrobenzene. The chrome alum formed, and which remains in the sulphuric acid liquor, is recovered by concentration and crystallization and is again converted into the dichromate.

7. *Nitro derivatives of Aniline.*—Aniline ($C_6H_5NH_2$) is capable of furnishing a series of explosives that may be employed in charging projectiles. We will examine some of the more interesting of them.

The *tetranitraniline* appears as a crystalline body very similar to picric acid. It is prepared by heating the metanitraniline at 80° with concentrated mixed acids. It is an extremely powerful explosive, very stable and contains 25.6 per cent of nitrogen. Its absolute density, 1.867, is relatively very high. It is partially decomposed on heating at a temperature which depends on the manner in which the increase in temperature in a given time has been effected. Thus if the rate of increase is 5° per minute the decomposition begins at 216°-217°. This does not give rise to explosion. While insoluble in water at ordinary temperatures it is very soluble in acetone. It does not attack metals. By reason of this assemblage of properties tetranitraniline appears to be most advantageous for use.

Another nitro derivative of aniline which is equally interesting from our standpoint is tetryl. This body which is tetranitromethylaniline ($C_6H(NO_2)_4NHCH_3$) contains 24.2 per cent of nitrogen. More powerful than gun cotton or melinite it is less so than tetranitraniline. According to Lieut. Colonel Koehler its heat of formation is -40.8 cals. Hence tetryl is an endothermic compound and this explains in part the power of this explosive. It is easily prepared by acting on methylaniline sulphate with mixed acids. It appears at present to be used only in the manufacture of cordeaux detonants. Many of the properties it exhibits tend to show it to be well fitted for use in shell charges. We may note, however, that its price, as well as that of the preceding explosive, is greater than that of picric acid.

COMMODORE FRANCIS H. GREGORY

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

OUR NAVY AND THE WEST INDIAN PIRATES

(CONTINUED)

A DOCUMENTARY HISTORY

By REAR ADMIRAL CASPAR F. GOODRICH, U. S. Navy

Porter made his headquarters at Key West (Thompson Island) or Allenton, as the settlement was then called, a central and commanding position from which to direct his operations. Early in March, he appeared off Porto Rico, his object being

to secure the co-operation of the local authorities, and with that end in view, on March 4th, he dispatched the *Greyhound,* Master-Commandant John Porter, with a letter to the Governor of Porto Rico.[1] Not getting a prompt reply, he sent the *Fox,* Lieutenant W. H. Cocke, into the harbor to inquire about the governor's answer. As the *Fox* was standing into the port a shot was fired over her from the fort, and as she did not immediately heave to another shot was fired, which killed Lieutenant Cocke. The fort followed this up with four other shot, when the *Fox* came to anchor under its guns. On making an inquiry, Captain Porter was informed that the governor was absent and had left orders to the commander of the fort to allow no suspicious vessels to enter, and it was in pursuance of this order that the *Fox* had been fired upon. It was the general belief of the American officers that the act was a retaliation for the capture of the *Palmira.* The matter was reported to the Government, but nothing further was done.[2]

On March 1 of this year, the brig *Bellisarius* was boarded and robbed by pirates,[3] and the experience of those on board corroborates Commodore Porter's reference to the atrocities committed by these marauders upon any unfortunates who happened to fall into their hands. Porter writes to the Secretary of the Navy, as follows:

U. S. SHIP "PEACOCK"

MATANZAS 28th March 1823.

Sir:

I have the honor to inform you that I arrived here on the 26th after giving to the North Coasts of St. Domingo and Cuba as thorough an examination

[1] ASP, I, 1103.

[2] M, II, 31. For further details, see Porter's letter to the Secretary of the Navy, March 14, 1823 (C. L., Vol. 1, 97), and to de la Torre, March 8, 1823 (ASP, I, 1105).

[3] *Vide* Introduction, p. 13.

as was practicable with the two Schooners[4] and the Boats of this ship with the greater part of her crew while all the Keys off shore pointed out to me as the rendezvous of Pirates were examined by the Ship.

The service has been very fatigueing to those employed for more than a week past in open boats and in the most dangerous and intricate navigation in the World, but it has been performed cheerfully, and I wish I could say successfully, but we have not in this long route been able to detect a Single Pirate, although our suspicions rested on many, nor can I conceive how we shall ever be able to detect them, for they are one day fishermen, another droguers, wood cutters, salt gatherers, or Pirates, as best suits them. Every Spaniard is armed with a Knife, and this weapon according to their mode of warfare is enough for them. Were we to apprehend every suspicious Spaniard and Vessel, their coasting trade would soon be entirely broken up.

Since my arrival here I have heard of the most horrid attrocities committed by them. They now spare no one, whole Ships Crews are indiscriminately burnt with their Vessels, and there has been an instance recently of the murder of a crew under the walls of the Morro.

* * * * * * * * *

Five piratical Vessels have for some Weeks been watching the fleet, in the Bay which I shall cause to be examined, and since our arrival as you will find by the enclosed copy of a note from a highly respectable source, they have dispersed and disarmed.

* * * * * * * * *

I was surprised to learn on my arrival here that circulars had been written by the Captain General to the Governors and Commanders of the different districts of the Island, forbidding the entrance of my squadron into any of its ports, or the landing of any part of my forces in pursuit of Pirates. The Island appears at Present in a very agitated state and the Government appear to think that the United States would consider it a very desirable acquisition. I shall use every means in my power to satisfy them that my objects are totally unconnected with any thing of a Political nature.

All Vessels ordered under my command, I beg may be directed to report to me at Thompson's Island.

I have the Honor to be
Very Respectfully Your
Obdt Servt.
D. PORTER.

Hon[b] Smith Thompson
Secretary of the Navy
Washington City.

P. S. Since writing the above I have heard of a pirate to norward and have dispatched the two schooners and boats after her. I shall know the result of the expedition in the course of a few hours and have good reason to believe it will prove successful.[5]

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[4] *Greyhound* and *Fox?*

[5] C. L., 1823, Vol. I, No. 122.

It is evident that Porter's business was not to be facilitated by the Spanish authorities upon whom must rest the responsibility for the long continuance of piratical depredations. After making all due allowance for the admitted claim to proper recognition of their dignity, there still remains the conviction that either through complicity or punctilio, they refrained from doing for themselves, or permitting others to do in their stead, what was imperatively necessary to put a stop to the nefarious traffic with its accompaniment of cruelty and murder. That such affairs as the following should occur so close to the palace of the captain general should not have been possible:

April 7—The brig *Gossypium*, Toscan, of Gloucester, was boarded near Havana by a piratical schooner. The crew were beaten in an unmerciful manner, and the captain and one man hung till they were apparently dead. They then robbed the vessel and left her to pursue her course.[6]

Still more outrageous in itself, and a great reflection on Spanish authority, is this:

Two American vessels, the *Lady's Delight*, of Baltimore, and the *Lively*, of Philadelphia, both lying in the port of Nuevitas, Cuba, *within the fort*, were plundered and carried off by a piratical schooner called the *Saragozana*, on the 10th of February. The masters and crews of those vessels, after much bad treatment, were suffered to go on shore, destitute of everything.[7]

The pirates were not suffered to ply their trade in peace. A portion of Porter's force, under Captain Cassin, stationed off the northern coasts of Cuba and San Domingo, was not slow in effecting a notable capture.

LATE PIRATICAL SCHOONER "PILOT,"
OFF HAVANNA, April 8th, 1823.

Sir;

In obedience to your orders I proceeded at ½ past 7 o'clock last evening with the Barges *Gallinipper* and *Musquito* to examine the coast to windward as high up as Escondido for pirates. In consequence of the lightness of the wind we were compelled to make use of our oars most of the time. This morning at daylight several small sail were in sight. We boarded a number and found them coasters. At 7 A. M. discovered a schooner about three miles to the Eastward, of a suspicious appearance, and immediately gave chase, the stranger apparently full of men and sweeping in shore. At 8:15 fired two muskets to bring the chase too, on firing the second gun; she commenced firing with round and grape and musketry. We returned it with our muskets, at the same time making every exertion to get alongside of her. At 8:30 the schooner succeeded in gaining shore. In an instant we were on board of her and succeeded in getting on shore. We however

[6] MWHP. [7] N, April 5, 1823.

secured one man, and found two of her crew killed, one on board, the other on shore. We have every reason however to believe that several were wounded. I landed the marines with some of the seamen, but the thickness of the underwood rendered it imprudent to pursue them. We succeeded in getting off the schooner (late the *Pilot* of Norfolk) without her sustaining any material injury. I am happy to state that not one of our men have been injured; this I consider the more remarkable and providential as the Pirates had every advantage in being in a large vessel, where he could load and fire with quickness and certainty. It may be proper to mention that the schooner on commencing her fire hoisted Spanish colours. The armament consisted of one double fortified six pounder, 23 muskets, 21 blunderbusses, 10 pistols, 6 fowling pieces, 1 swivel blunderbuss, with a number of cane knives, swords and dirks. From the prisoner I have ascertained that her complement consisted of thirty-six men. . . . .

I have the honor to be, Sir,
Respectfully yours, &c.,
C. K. STRIBLING.

To Captain S. Cassin,
Commanding the Division of Schooners
and Barges.[8]

Additional details are contained in a letter from an officer to a friend in Washington, dated at Havana, April 9, 1823:

We captured a piratical schooner called the *Pilot* yesterday morning about 8 o'clock about 20 M. eastw. of Havana—2 cutters—15 minutes. We killed 2, wounded several; one prisoner. Pursued them to the woods with marines and sailors. One killed on beach, etc. Boats commanded by Lieut. Stribbling. 36 men on board the *P.*

Stribling, by the way, was attached to the *Peacock,* from which vessel Captain Cassin had dispatched the two barges.

April 11—The brig *Tropic,* Stevens, of Boston, was taken by pirates in Campeachy Bay: afterwards retaken by H. B. M. sloop of war *Tamar.*[9]

This is chiefly interesting in showing that British cruisers were also active in West Indian waters at this time.

While exact details are lacking, the following notice indicates that Porter started his work in a systematic manner and that the pirates were, generally speaking, in hiding, however ready on favorable occasions to dash out after their prey:

Commodore Porter, in the *Peacock,* reached Matanzas about the 26th of March. He had divided his light squadron into four parts, to scour the coasts. The *Peacock* and two of the schooners had "left no hole or corner unsearched" for the distance of 300 miles—under severe duty, but without success. Several vessels of a suspicious character had been fallen in with,

[8] O. L., 1823, Vol. 3, No. 16. Additional authorities: S. O. (C. L.), LXXXI, 97; CHN, 26; E, 78; NEE, 310; ASP, I, 1109.
[9] MWHP.

but nothing sufficient appeared to justify their detention. The pirates change their shapes daily. Their depredations are spoken of as horrible—whole ships' crews are often murdered by them. A letter says—"We were surprised to hear, on our arrival, that the governor of the island, (Cuba) had given orders to all the governors and commandants of districts, forbidding our entrance into any of the ports. It is to be hoped we may have no difficulty with them; but, if we do, the fault will not be on our side."

There was a fleet of American vessels at Matanzas, waiting for convoy; some had been ready for sea for twenty days—there was not a vessel on the coast to protect them. Com. Porter's presence secured it to them.

Some one in Philadelphia, who has kept a list of piratical acts since the cessation of hostilities in 1815, makes them amount to *three thousand and two*.[10]

In view of subsequent events, Porter's optimism seems a trifle premature; still, great success had attended the first month's exertions.

U. S. STEAM GALLIOT "SEA GULL"
MATANZAS, April 24, 1823.

Sir:

In my last I informed you that I had dispatched the Barges to examine a Bay to windward of Point Yeacos,[11] and having intelligence of three piratical Schooners in the River Palmas,[12] I left this place on the 19th joined the Barges next day near Key Blanco, and after a laborious search of two days, discovered the River, where we found the remains of the vessels which the Pirates had burnt, evidently, a short time before our arrival there, I consequently returned to this place, sending three of the Barges along the coast to Havanna, to which place I shall proceed, after giving convoy to the vessels in this place, having found it necessary to send the two vessels employed here on this service to Thompson's Island to refit.

I believe sir I can now say with safety, that there is not a pirate afloat on this part of the Coast of Cuba larger than an open boat, and even that is doubtful; the *Saragosiana* in her flight from here, having been taken by two British Sloops of war at the East end of the Island.

I have the honor to be
Your very Obt. Servt.
D. PORTER.

Honble Smith Thompson.[13]

Captain Cassin's letter, next quoted, describes in brief official terms the nature of the work assigned him and creditably executed:

U. S. SHIP "PEACOCK,"
THOMPSON'S ISLAND, April 28, 1823.

Sir: I had the pleasure to inform you, by a sloop from the Havana, bound to this place, on the 10th instant, of the successful beginning of my cruise, by the capture of the piratical schooner *Pilot*. After having shewn the

[10] N, April 19, 1823.
[11] Seventy miles east of Havana and off Cardenas.
[12] Empties into Santa Clara Bay, a part of Cardenas Bay.
[13] C. L., 1823, Vol. 2, No. 50.

Pilot in Havana, and obtained a small quantity of water, I proceeded with the division to Cayo Blanco.[11] We entered within the reef, and proceeded westward, making an average of about twenty miles per day, leaving no bay, inlet, or suspicious place, unexplored. On the 16th, a sloop boat was observed standing to the eastward. The *Musquito* was ordered in chase; the sloop directly altered her course for the land, was run on shore, and abandoned by her crew, who escaped into the bushes. She was found to have arms of different descriptions, shot, and other articles of a suspicious nature, which satisfied me of her piratical character; and I took possession, with an intention to destroy her, as she was rotten, and an encumbrance to us.

At 10 A. M. on the same day, we anchored in a noted harbor for pirates, intending to examine it thoroughly. Our anchor was scarcely gone, before a felucca was discovered standing out for the *Gallinipper*, who was ahead, sounding. On opening our vessels, she immediately hauled down her sails, and pulled around the point of an island. The barges were ordered in chase, accompanied by all the boats we could muster. On their getting to where the felucca had disappeared, several houses were discovered, and a number of men busily employed carrying things from them, and, at the moment, were supposed to be fishermen. It was some time before the felucca was discovered, and, when found, was dismantled and covered with bushes, hastily thrown over.

When the pirates (which they proved to be) found she was discovered, they fired a volley of musketry at our boats, which fortunately proved harmless. The officers and crews immediately landed, and pursued them through the bushes, when a running fight of more than half a mile took place, the pirates frequently turning, for a moment, and firing, which was returned occasionally, but without effect, from the eagerness with which they were pursued. So closely were they pressed, that they threw off shoes, clothes, and other incumbrances; but, from the thickness of the bushes, and knowledge of their path, all made their escape. Their establishment, which consisted of five houses, was set on fire, and the felucca brought off. She is a fine boat, coppered, pulls sixteen sweeps, and is, in every respect, equal to any of our barges. She appears to have been recently fitted, and, I presume, was on the eve of making her first cruise. The old boat, which was taken in the morning, I gave to a fisherman, who was serviceable to us as a pilot, she being an incumbrance.

On the 17th, we proceeded, examining all places very minutely; and, from the intricacy of the navigation, did not arrive at Cape St. Anthony until the 21st. From the moment we passed within the reef, until getting to the cape, we were obliged to keep the barges ahead, sounding. The vessels were all trimmed by the head, and every precaution taken, yet we frequently grounded. Many places, for several miles, we found only seven feet water, and frequently less than six, when we were obliged to run out anchors, and heave through the mud. I learnt, on the same passage, from the fishermen, that the English attempted the same, but succeeded only part of the way. I also found the British sloop *Scout* cruising off the cape, from the com-

[11] Nearly 100 miles west of Havana.

mander of which we learnt they had numbers cruising in that quarter, and on the south side.

The passage within the Colerados, from the beginning to end, I found extremely intricate, but I am much gratified by knowing we are the first who accomplished it. We suffered much for water, and the small quantity we were enabled to obtain, was such as I apprehended would create disease amongst us. And, for the successful termination of the cruise, I tender to lieutenants-commandant Stephens and Valette, lieutenant Stribling, and their officers, my sincere thanks.

I have the honor to be,
Very respectfully, &c.
S. CASSIN.

Commodore David Porter
Commanding U. S. Naval Forces
in the West Indies.[15]

While our cruisers were busy along the north shore of Cuba, an American vessel was taken on the other side of the island:

May 5—The brig *Reuben and Eliza,* Harris, of Norfolk, was taken off the Isle of Pines, by a piratical schooner. The mate and four of the crew escaped in boats.[16]

Notwithstanding this mishap, occurring very nearly at the time of his writing, Commodore Porter was justified in his comments on the satisfactory character of the situation.

U. S. GALLIOT "SEA GULL"
ALLENTON THOMPSON'S ISLAND
May 10th, 1823.

Sir:

Since I last had the honour to address you, I have returned to this place, with the *Sea Gull* and barges, and found here captain Cassin, with the schooners and barges that accompanied him.

Our last cruise has been altogether a most anxious and fatigueing one; and although we have not many trophies to show, it has not been without effect. The result has been the capture of a Piratical Schooner and a very fine Felucca, the destruction of one on shore, the Burning of three Schooners in the Rio Palmas and about a dozen of their Houses in the different establishments to leeward of Bahia Honda and inside the Colerados Reef, the complete dispersion of all their gangs from Rio Palmas to Cape Antonio, and what will be of no little importance in all our future operations, a most thorough and intimate acquaintance with the whole line of coast from Cayo Blanco to the East, down to Cape Antonio to the West. We have taken only one Prisoner, and I shall endeavor to use such information as I can squeeze out of him to advantage.

I shall dispatch the *Peacock* to day for La Vera Cruz to relieve the *Shark* and shall now be left with only my small vessels, two of which, with two Barges (which I have found great difficulty in maning from the *Sea Gull*

[15] ASP, I, 1110. [16] MWHP.

and Store Ship) I shall send off this evening under the command of Lieut. Comdt. Watson on an expedition among the Keys in the old Straights,[17] and thence around the Island, to return by the way of Cape Antonio.

Two Schooners under Lieut. Comdt. Rose are making the circuit by the other route, commencing at Point Yeacos, going round Cape Antonio and returning by the Old Straights, two under command of Lieut. Comdt. Skinner are convoying from Havanna, and the remaining two are careening and will in a few days sail for the protection of our commerce and the three remaining Barges are hauled up for the want of men.

When I left Matanzas, the country was alarmed by large bands of robbers, well mounted and armed, who had plundered several estates, and committed some murders in the neighborhood of the city. Bodies of horse had been sent in pursuit of them, and the militia were all under arms; some prisoners had been taken, and it was said that those bands were composed of the free-booters which lately infested the coast, and who, being compelled to abandon the ocean, had taken up this new line of business.

I have the Honor to be
Your Very Obdt. Servt.
D. PORTER.

Honbl. Secretary of the Navy
Washington City.[18]

On the 15th of April, as already mentioned, Patterson had given orders to Gregory,[19] in the *Grampus,* to go to the Bay of Campeche and round up those pirates who had attacked the American ship *Bellisarius,* robbing her and murdering the captain and the cook. Gregory carried out his orders from Patterson with his accustomed energy, engaging two vessels near Campeche. One he drove on shore; the other he seized and turned over to the local authorities.[20] He made his official report to Commodore Porter:

U. S. SCH. "GRAMPUS," THOMPSON ISD.
July 3d, 1823.

Sir:

I have the honor to inform you, that this vessel sailed from the Balise, on the 24th. April, with a convoy for Tabasco, where she arrived on the 1st. May—sailed thence again on the 6th. with a convoy towards Vera Cruz parted with the convoy on the 9th., and arrived at Campeachy on the 13th., where I received information, of several piracies committed upon the merchant vessels of the U. S.; and that the coast of Yucatan, from Cape Catouche,[21] to Lagoona[22] was then infested by several gangs of pirates, who

[17] Old Bahama Channel.
[18] C. L., 1823, Vol. 2, No. 97; ASP, I, 1109.
[19] C. L., 1823, Vol. 2, No. 44.
[20] E, 78.
[21] Northeast extremity of Yucatan.
[22] Laguna de Terminos, at the bottom of the Gulf of Campeche.

had been guilty of every atrocity imaginable; finding there were a very considerable number of Merchantships at the several ports upon that coast unprotected, and others arriving almost daily, I continued thereabouts until the 25th June scouring the coast, up and down, and occasionally, when any information was had, which offered the least chance of detecting those villians, the boats were employed, and sometimes were sent along the coast 20, and 30 leagues from the vessel: On the 22d. May I chased a schooner on shore, to windward of Siral [Sisal?] which I have no doubt was a pirate, from his appearance and conduct: as it was in the night, and upon a part of the coast where I was not sufficiently acquainted, and blowing fresh upon the shore, I had not an opportunity of compleating his distruction: on the 11th. June, I seized a suspicious vessel in the harbour of Campeachy, and resigned her to the authorities there upon that account. This last vessel had just come from New Malaga, or Virgia de Chiguila, a little to the westward of Cape Catouche, where the pirates have a very considerable establishment and came down Campeachy for purpose of procuring stores for a vessel then prepairing for a cruise. Two seamen who had been held as prisoners at N. Malaga, informed me that this gang were sometimes a hundred and upwards in number, that they held possession of a small fort having two twenty four pounders; and that an officer named Molla, who had been placed there by the Government had joined them, this was corroborated by the authorities at Campeachy—who requested me to land and destroy the place. The pirates issue from their post in barges, small vessels, and in canoes; hover along the shores, enter the harbour murder and destroy almost all that fall in their power: on the 2nd. June the American Schr. *Shibbolet,* Capt. Perry, of N. Y. being then ready for sea, was boarded by a canoe having fourteen of these villians on board; the watch was instantly murdered eight others of the crew, were put in the forecastle, the hatch spiked down, a ton or more of Logwood put over it: the head sails set—with the wind off shore—and fire put to the vessel in the cabin—by the most extraordinary exertion, these now broke out, in time to save their lives. I arrived while the vessel was burning down. The same canoe then proceeded to windward and two days afterwards, took the Schr. *Augustus and John* off Sisal—and burnt her, having turned the crew adrift in a small boat—with every probability of their perishing. The people of the country were much exasperated, and turned out to hunt them from their shores—a party of Dragoons having met them, a skirmish insured, wherein the Captain of Dragoons, and several of his men were killed, and the pirates taking to their boats escaped—one of the seamen, I mentioned, as having been amongst them stated that he belonged to an English Sch. from N Providence called the *Flyer,* that the crew with the exception of himself were instantly butchered—he was detained by them about two Mo[nths] during which time they had captured nine vessels, some of which were brought in, but the principal part destroyed, and in some instances he was certain that the whole crew were murdered—when he left the place (about twenty days since) they had a Guinaman with two hundred slaves and a large quantity of Ivory two small schooners, Americans, and an English cutter [hiatus in MS.] informed me that pirates had a direct and uninterrupted intercourse with Havanna, by means of small coasting vessels that

ran regularly to the ports on the coast, and always touched at N. Malaga—frequently some of them would go up to the Havanna, and others of the gang came down—That this infernal horde of villians have established themselves at N. Malaga I have no doubt, and from the information given me by men of the first respectability at Campeachy, Siral, and other places on that coast, I believe the pirates have been guilty of all the acts herein stated.

I have the Honor to be
Very Respectfully
Your Mo. Ob. Ser.
FRANK GREGORY
Lt. Comd. U. S. N.

Comd. David Porter
Comg. U. S. N. forces
W I. Station.[23]

It was perhaps somewhat early to sound a pæan of victory over Porter's remark quoted below; still the fact of great success on his part is patent, no less than the menace to the population of Cuba through the driving of these marauders off the sea:

A letter from Allentown details the operations of the light squadron in scouring the coasts of Cuba, and affording convoys. The duty is a most severe one, but it has been effectually performed. "It is not believed that a single pirate is to be found between Point Yacos and cape Antonio." Excluded from the ocean, they are carrying on their trade on the land. Large bodies of them, well mounted and armed, are plundering the plantations and murdering the people of Cuba. They abound in the neighborhood of Matanzas. A party of cavalry had captured five of them, and the militia had been turned out to scour the country. If hemmed in much longer by com. Porter, the authorities of Cuba, in self-defence, must exterminate them, if they do not abandon their horrible business. Not one piracy has been lately committed.[24]

Porter's general view of the situation is thus revealed:

A private letter from the commodore, dated on board the *Sea Gull*, June 11th, says—"I keep every one very busy; and, although the service has been severe and some are very sick of it, I have good reason for believing, that all who leave my command will do it with a desire to return to it whenever their services may be wanted. The fact is, that the disappearance of all the pirates, and our want of success in catching the rascals is somewhat discouraging to us; but all are satisfied that our failure was owing to other causes than a want of exertion on our part. The fact is, our enemy is an invisible one; he has only to throw on the fairy mantle of a Spanish passport, which they all go furnished with, and the pirate is completely concealed from our view.

[23] From the original manuscript in the New York Public Library.
[24] N. May 31, 1823.

Piracy is now down on this side of the island, and I hope soon to give as good an account of the other side. A pirate has, however, appeared there, and made two captures lately—but the most of the pack, the *Greyhound*, the *Terrier, Ferret Weazle, Fox* and two barges are in full pursuit; if he escapes he must have good luck.

There has not been a single act of piracy committed here since I came on the coast, and the above is the only one I can hear of on the south side, which we have left pretty much to the British. . . .[25]

The newspapers at home were convinced of the good effect of Porter's operations and, in sympathy with him, spoke of some of the obstacles placed in his path by local Cuban officials: One of them says that, as a result of his work, " it appears that many of the pirates, finding their trade at an end, have entered into the kindred business of the slave trade." Porter complained to the captain general that the commanders of certain districts refused to permit his vessels to enter the small ports, which he understood from them was in consequence of orders from the captain general. The commanders had lied, for the captain general, on May 10, had issued a circular that " whenever this [*P's*] squadron may arrive and present itself to the constituted authorities, they must afford it every aid which may be compatible with the territorial privileges and respect. Signed Francisco Dionisio Vives."[26]

It was just prior to the writing of Porter's letter of June 11 (previously quoted) that the following outrages occurred, although not near the scene of the commodore's operations:

American schooner *Harriot* plundered in May by Spanish privateer *Prudente*, Captain Renshaw.[27]

June 2—the schooner *Shibboleth*, Perry, of Newport, was cut out of Campeachy in the night and burned by the pirates. One man was murdered, the remainder escaped.[28]

June 4—the schooner *Augustus and John*, of Catskill, was cut out in the night by pirates.[28]

The vessels mentioned in the following newspaper rumor have not been identified. The concluding paragraph is of special significance, and it was purely gratuitous to attribute to pirates a row which is of frequent occurrence in all ports of the world:

Two or three vessels are reported as having been lately captured by the pirates on the south side of Cuba—and it was feared that the crew of one of them had been murdered. The late master of one of the captured vessels had reached Havana. Several vessels of com. Porter's squadron immediately sailed in quest of the offenders. It was rumored that a large

[25] N, July 19, 1823. [26] N, June 14, 1823. [27] MWHP.
[28] MWHP; *vide* Gregory's letter, p.

piratical schooner was cruising off Campeachy, at the latter end of last month.

An affray took place at Matanzas on the 26th of last month, between certain Spaniards who were supposed to have been engaged in piracy, and the Americans who happened to be on shore. The latter were much outnumbered and severely beaten, but it is not stated that any were killed. One account says that this affair took place in consequence of the bad behavior of an American sailor, in a state of intoxication.[29]

On June 19, near Matanzas, the schooner *Ferret,* Lieutenant T. M. Newell, raised and carried off two launches, and on July 12, the same schooner captured five cannon hidden in a mangrove swamp in the Artigos River.[30]

Newell's report to his commander-in-chief gives the details of the first-mentioned episode:

UNITED STATES SCHOONER "FERRET,"
THOMPSON ISLAND, June 25, 1823.

Sir:

Pursuant to your instructions, I left this place on the 14th inst. on a cruise to Trinnadad on the south side of Cuba in company with the *Beagle,* Capt. Newton. On the second day we parted company and on the third day I made the Havanna (on my way to Matanzas) from thence I commenced a diligent search in all the by ports and bays, on Tuesday sending a boat into Canise[31] and obtained information that some Pirates were still lerking about the coast. During the night I kept close in with the land & on Wednesday at 10 A. M. discovered an armed barge with 16 oars and well manned, in a small bay called Bacuna Yeanga.[32] I immediately sent Leut. Dorning with five men the most any boat could carry, to examine all the boats, there being seven in number; he approached within fifty yards of the barge when the crew shew their character, by opening a fire on him with musketry & blunderbusses, which fortunately did no other damage than nearly to sink the boat, she having received a ball at the water edge, five others were found in the boat, which being nearly spent had struck the water & inocently jumped into her, my boat at no time was suitable for the transportation of men & now rendered useless, induced me to take possession of a small coaster that was near & man her with fifteen men & at that time intended to stand in if possible with the *Ferret* in order to cover the men while they took possession of the barge which then had the American colours union down, but on approaching found that the channel wou'd not admit of my entering, it then blowing very hard and a heavy sea on, I deemed it proper to recall the coaster which had liked to have gotten ashore, for had that catastrophy occured, I question much whether the pirates would have had

[29] N, June 21, 1823.

[30] E, 78; C. L., 1823, Vol. III, No. 66 (enclosure) doubtless refers to the same affair.

[31] Canasi River?

[32] Not identified, but evidently near Matanzas.

the gratification of butchering them, as they certainly would have been drown'd—the sea was then breaking with great violence over the reef that covered the bay. I was then compelled to resort to making tacks close in with the reef, and giving them long tom with round & grape, in hopes to destroy the boats. As to killing any of them it was impossible, for on the approach of the *Ferret* they would completely secure themselves behind the rocks & trees which hung all around the harbour, but this I was frustrated in by the enormous roughness of the sea, and the wind being on shore, prevented me from taking any position from which I could annoy them much, finding it impossible to do anything with the means then in my power, I stood out to sea in hopes to fall in with some vessel from which I could get available boat (but I am sorry to say that it was not until the next morning that my wishes were obtained) & if that could not be done to push to Matanzas, to concoct a plan with the governor by which the pirates as well as their boats may be taken. I however obtained a boat from an English vessel, & immediately bore up for the same place which was then but a short distance off. I had not run but a short time when I discovered a Spanish brig of war lying too off the bay, which proved to be the *Matas*, on the report being sent to the Governor of Matanzas that one of the U. S. Schooners were engaged with the Pirates, he dispatched this brig and at the same time took with him a land force and had arrived there a few minutes before me, and had taken possession of a small schooner boat the Pirates had abandoned and which lay on the beach. I sent in my boat after he had left, and ordered a search, when two of the boats I had seen the day I attacked them, where found sunk well up a lagoon, which upon further examination extended several miles into the island, and have no doubt but that the large barge is now at the head of it, but not being prepared with boats I did not think it proper to send my boats out of [reach?] of the *Ferret*. The two boats I have brought over and shall await your orders relative thereto.

On my arrival at Matansas I found my main mast very dangerously sprung, which made it necessary for me to return home, but not until I had given convoy to eight of our merchantmen, from Matansas & Havana.

I have the honor to be
Sir,
Very Respectfully
Your Obt. Svt.
THOS. M. NEWELL.

Comer. David Porter
Commander of the U. S. Naval
forces West India Station.[33]

For the affair near Sagua la Grande, about 150 miles east of Havana, we are fortunate enough to have full official reports:

"SEA GULL," ALLENTON,
THOMPSON'S ISLAND, July 17, 1823.

Sir: It is with infinite satisfaction I do myself the honor to lay before you, lieut. commandant Watson's official report[34] of the almost total annihilation

[33] From the original manuscript in the New York Public Library.
[34] *Vide, supra.*

of the crews of two piratical vessels, by the two barges, *Gallinipper* and *Musquito*, under his command.

When we take into consideration the immense superiority of force opposed to him, the advantage and preparation on the part of the pirates, and the result of the action, we cannot but be impressed with the conviction, that nothing less than providential influence and protection could have occasioned consequences so fatal to the pirates, and so exempt from injury on our side, as to appear almost miraculous.

The five surviving pirates, being desperately wounded, I have, in compliment to the favorable disposition and zealous co-operation of the authorities of Havana, sent to the captain-general of Cuba, to be tried by the laws of Spain. Enclosed is a copy of my letter to him on the subject.

I cannot close this communication without expressing a hope, that the brilliant success of lieut. com. Watson, and his excellent character as an officer and a man, may induce the department to promote him to a higher grade, as the most suitable reward for his services.

I have the honor to be, with great respect,
your obedient servant,
D. PORTER.

Hon. Secretary of the Navy.[35]

Commodore Porter's letter to Governor General Vives, referred to above, needs citing:

U. S. GALLIOT "SEA GULL," ALLENTON,
THOMPSON'S ISLAND, July 13, 1823.

To his excellency don Francisco Dionisio Vives, capt. general of the Island of Cuba and its dependencies.

Your Excellency: With a full confidence that they will be brought to condign punishment, I send you, to be tried by the laws of Spain, five pirates, taken on board two piratical vessels by two of the barges of my squadron. I also send, by the same conveyance, two men, making part of the original crew of one of the vessels when she fell into the hands of the pirates.

The witnesses being on the spot, will enable you to make the punishment prompt, and the example, I have no doubt, will be highly salutary.

With sentiments of the highest respect, I have the honor to be,
Your excellency's very obedient humble servant,
D. PORTER,
Commanding U. S. naval forces in the West Indies and Gulf of Mexico.

Watson's report on the capture of these pirates (mentioned by Porter in his letter of July 17 to the Secretary of the Navy) is as follows:

U. S. GALLIOT "SEA GULL," ALLENTON,
THOMPSON'S ISLAND, July 11, 1823.

Sir: Having had the honor to report the circumstances attending the cruise of the division under my orders, prior to our separation off St. John de los Remedios,[36] I have now to communicate, for your information, my subsequent proceedings in the barges *Gallinipper* and *Musquito*.

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[35] N, August 9, 1823. Also: CHN, III, 26; CDP, 289; E, 78; C. L., 1823, Vol. IV, No. 14.

[36] About 175 miles east of Havana.

After a strict examination of the coast and islands, from Cayo Francis to Cayo Blanco, in the vicinity of Point Hycacos,[87] whilst cruising in Siguapa Bay, we discovered a large top-sail schooner, with a launch in company, working up to an anchorage, at which several merchant vessels were lying. Being to windward, I bore up with the *Gallinipper*, for the purpose of ascertaining their characters, and when within gun-shot, perceiving the large vessel to be well armed, and her deck filled with men, I hoisted our colors; on seeing which, they displayed the Spanish flag, and the schooner, having brailed up her fore sail, commenced firing at the *Gallinipper*. I immediately kept away, and ran down upon her weather quarter, making signal, at the same time, for the *Musquito* to close; having much the advantage in sailing, they did not permit us to do so, but made all sail before the wind, for the village of Siguapa, to which place we pursued them, and, after short action, succeeded in taking both vessels, and effecting the almost total destruction of their crews, amounting, as nearly as could be ascertained at the time, to 50 or 60 men, but, as we are since informed, to 70 or 80. They engaged us without colors of any description, having hauled down the Spanish flag after firing the first gun; and, on approaching to board, (our men giving three cheers, and discharging their muskets), the pirates fled precipitately, some to their launch, (lying in shore, from whence a fire was still kept up), whilst others endeavored to escape by swimming to the land. A volley of musketry, directed at the launch, completed their disorder, and drove them into the sea; but the boats going rapidly through the water, cut off their retreat, with the exception of fifteen—eleven of whom were either killed or desperately wounded, and taken prisoners by our men, who landed in pursuit: and the remaining four apprehended by the local authorities, and sent to Matanzas. The larger vessel was called the *Catalina*, commanded by the celebrated pirate Diaboleta, taken some weeks since from the Spaniards, between Havana and Matanzas, carried to Siguapa Bay, where she received her armament; had captured nothing, this being the commencement of her piratical cruise.

I cannot close this communication without performing a most pleasing task in reporting the active gallantry and good conduct of my officers and men, none of whom sustained the slightest injury in the action, the result of which, I trust, is sufficient to satisfy you that all under my orders did their duty, particularly when it is considered that we had but twenty six men, opposed to a force of piratical vessels, well supplied with arms of all kinds, amongst which was one long nine and two six pounders. I have much pleasure in naming, as my associates, lieut. Inman, acting sailing master Bainbridge, Dr. Babbit, midshipmen Harwood and Taylor; and Messrs. Webb and Grice, who obeyed and executed all orders and signals with a promptitude and zeal which could not be exceeded.

I have the honor to be, very respectfully,

Your obedient servant,

W. H. WATSON.

Com. D. Porter, commanding
U. S. naval forces in the West Indies
and Gulf of Mexico.

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[87] Point Icacos.

A more graphic, not to say lurid account of this affair is the following:

We have, almost every day, heard of something that evidenced the activity of com. Porter and the officers and men under his command; but, as yet, their industry and zeal was rather shewn in the *suppression* of piracy than the *punishment* of it: at last, however, an opportunity has offered for inflicting the latter, as detailed in the following letter, published in the *National Intelligencer,* dated Matanzas, July 10—"I have the pleasure of informing you of a brilliant achievment obtained against the pirates on the 5th inst. by two barges attached to commodore PORTER'S squadron, the *Gallinipper* lieut. Watson, 18 men, and the *Musquito* lieut. Inman, 10 men. The barges were returning from a cruise to windward; when they were near Jiguapa bay,[38] 13 leagues to windward of this port, they entered it—it being a rendezvous for pirates; they immediately discovered a large schooner under way, which they supposed to be a patriot privateer; and as their stores were nearly exhausted, they hoped to obtain some supplies from her; they therefore made sail in pursuit. When they were within cannon shot distance, she rounded to and fired her long gun, at the same time run up the bloody flag, directing her course towards the shore, continuing to fire without effect; when she had got within a short distance of the shore she came to with springs on her cable, continuing to fire; and when the barges were within 30 yards, they fired their muskets without touching boat or man; our men gave three cheers, and prepared to board; the pirates, discovering their intention, jumped into the water, when the barge men, calling on the name of 'Allen,' commenced a destructive slaughter, killing them in the water and as they landed; so exasperated were our men, that it was impossible for their officers to restrain them, and many were killed after orders were given to grant quarters; Twenty seven dead were counted, some sunk, five taken prisoners by the barge-men, and eight taken by a party of Spaniards on shore; the officers calculated that from 30 to 35 were killed. The schooner mounted a long nine pounder on a pivot, and 4 fours, with every other necessary armament, and a crew of from 50 to 60 men, and ought to have blown the barges to atoms, commanded by the notorious Diableto or Little Devil; this statement I have from lieut. Watson himself, and it is certainly the most decisive operation that has been effected against those murderers, either by the English or American force. This affair occurred on the same spot where the brave Allen fell about one year since."[39]

[38] Adjoins Cardenas.

[39] N, August 2, 1823.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE UNITED STATES POWER SQUADRONS

A LETTER FROM MR. ROGER UPTON

DEVEREUX, MARBLEHEAD, MASS., January 14, 1917.

Secretary of the United States Naval Institute, Annapolis, Md.

DEAR SIR: I have been asked by several naval officers to write an article for the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, describing the United States power squadrons and setting forth suggestions relative to the organization of a motor-boat patrol.

I am not a good writer, but as I have navigated and cruised the Atlantic coast between Saint John, New Brunswick, and Norfolk, Virginia, for over 30 years, in steam, sail and motor yachts varying from 30 to 130 feet in length, and in merchant vessels, and have for over five years made a careful and intimate study of motor-boats, it may be assumed that I am somewhat familiar with the coast, with yachtsmen and with motor-boats. From my association with naval officers I have obtained some idea of what would be required of a motor-boat patrol. Therefore, this letter is sent for whatever it may be worth and the question of its publication in the PROCEEDINGS naturally remains to be decided by you.

In 1912 the motor-boat owners of the Boston Yacht Club associated themselves together in what was then called a Power-Boat Division. Their purposes were to establish a high standard of skill in the handling and navigation of motor-boats, to promote social intercourse among themselves, and to try to so qualify themselves as to be of possible assistance to the United States Navy in time of war. In organizing the division, and in undertaking their drills and maneuvers, these owners were greatly assisted by suggestions and advice from Rear Admiral W. F. Fullam, U. S. N., and Commodore Edward Lloyd, U. S. N., retired. The division proved to be a success, and as a result a similar division was organized in the Portland Yacht Club of Portland, Maine. In 1913, at the

request of the then commodore of the Boston Yacht Club, the name of the organization was changed to Power Squadron of the Boston Yacht Club.

News of the organization had clearly reached the Navy Department, because I was requested by the Assistant Secretary of the Navy to go to Washington and explain it. I did so, and was then asked by him to try to extend the movement among other yacht clubs and thus make it a national movement. I reluctantly assented to his request, as most of my time was, and is, taken up by my business interests, and I also much prefer to remain in the background rather than occupy a position towards the front of the stage. Invitations were sent to over 80 yacht clubs on the Atlantic coast to attend a conference on the subject. Thirty-three of the clubs sent delegates to a conference in New York, where the matter was explained and discussed. Three months later, a second conference was held and 22 clubs voted to form a national organization. The name selected for the national organization was United States Power Squadrons, and each branch unit was called a local squadron. The purposes of the organization were an extension of the original purposes of the first Power-Boat Division. Mr. Henry A. Morss of the Eastern Yacht Club was of invaluable help in planning the national organization, and the government evinced its interest by sending to the conferences Rear Admiral Fullam, to represent the Navy Department, and Deputy Commissioner of Navigation A. J. Tyrer, to represent the Department of Commerce. The organization was laid out on semi-naval or military lines, there being a chief commander, a vice commander, a rear commander, a secretary, a treasurer, four members-at-large of the governing board, a committee on rules, a committee on instruction and examination, and district boards of instruction and examination. The Navy Department and the Department of Commerce were each to have a representative on the governing board, and Vice Admiral D. W. Coffman was appointed to represent (and does now represent) the Navy, while Mr. Tyrer was appointed to represent (and does now represent) Commerce.

To ensure proper responsibility the organization was made an incorporated body, a charter being taken in Massachusetts, and the legal name being United States Power Squadrons, Incorporated.

The distinguishing flag first adopted by the national organization was a red, white and blue streamer or pennant, with a white star in the red, to be displayed as a commission pennant at the masthead day and night. This pennant proved acceptable and was well liked. It was, however, objected to by the Navy Department as not being distinctive enough. After careful deliberation and consideration, the present distinguishing flag was adopted, upon the advice of the Navy Department. It is a rectangular flag, the width being nineteen thirty-sixths of the length, consisting of a fly of seven blue and six white alternate vertical stripes of equal width and a red field containing a circle of 13 white five-pointed stars surrounding a white foul anchor. The idea advanced by the Navy Department was to have something on the lines of the blue ensign of England, which is used to denote naval reserve, wherefore the design approximated our yacht ensign with the colors reversed and with the stripes vertical instead of horizontal. (Horizontal stripes of blue and white would too closely approximate the colors of Greece, Cuba and Salvador.) To any person at all familiar with flags, this squadron flag cannot for a moment be confused with any other flag habitually used in our waters. The flag is protected by patent and by registration.

Then came the question of where the squadron flag should be displayed. Custom has decreed that motor yachts shall display a club flag at the bow, the owner's private signal at the masthead, and the yacht ensign at the stern, and we should remember that few, if any, motor-boats have over one mast. To display the squadron flag at a spreader would not accord with etiquette; to display it on the same hoist with another flag would brand the owner as a landlubber; to display it in place of the club flag or the private signal was not favored by the owners. What should be done? At this moment, it was discovered that the yacht ensign is not legally an ensign at all, but merely a specific flag designated by the Secretary of the Navy as a distinguishing signal for yachts. Custom has made of that signal an ensign. There was, therefore, no reason why a squadron member should not display the squadron flag at the stern instead of the special yacht signal, and the majority of squadron members have so preferred to do. As a matter of fact, the United States Power Squadrons has never specified how and where its flag should be displayed, leaving that question to the preference of its individual members. Moreover, the national

organization has always expected that, when associated with or maneuvering with vessels of the United States Navy, or acting under the orders of naval officers, the squadron flag would not be displayed, club flags and private signals would not be displayed, and the flag displayed at the stern of the motor-boats would be the United States ensign; and this was carefully observed by the squadron boats which participated in the naval maneuvers off Boston in September, 1916. When not on naval duty, and during peace, I personally can see no good reason why a squadron boat should not display the squadron flag at the stern, if the owner so wishes.

This question of the squadron flag has been much misunderstood, and even naval officers have incorrectly and unjustly commented thereon. A careful investigation of the facts would have revealed to all critics exactly what I have herein explained.

The United States Power Squadrons has to-day over 20 local squadrons or branches, new ones being formed at the average of about five each year. To care for the ever-increasing administrative work, there has been created the office of chairman of the governing board, while the chief commander is the head line officer and attends to the purely fleet or squadron work. The fundamental idea of the squadron movement has, I am told, had quite a little influence in the motor-boat patrols utilized by England, by Russia and by Germany. It is perhaps to the credit of the United States that the plan assumed concrete form at least two years before the outbreak of the present war in Europe.

Relative to a motor-boat patrol, my suggestions are based upon several premises, namely: 1. That motor-boats can successfully be used as scouts or eyes to help our own submarines; as scouts and patrol to give warning of the presence of enemy submarines and destroyers; as scouts, guards and patrol of mine fields, harbor entrances, channels, and inshore along the coast; as light drag-net boats and mine sweepers; as dispatch boats under certain conditions; as transports (in a small way) in cases of emergency.

2. That, with the existing shortage of naval officers (a condition likely to continue for some years), there could be spared in time of war very few, if any, naval officers to have charge of the many details concerned with an efficient motor-boat patrol.

3. That, to particularly provide against premise two, the motor-boat patrol be so organized and trained as to form a complete

organization of officers and men competent to look after all of their special affairs, always under the orders and general supervision of the naval officer commanding the district, or section, or fleet, or squadron, or naval force, with which or in which the motor-boat patrol units are assigned. In other words, as this is a specialized work, I would have the motor-boat patrol made responsible for all the details in a manner similar to the torpedo-boat organization of the German Navy, so many complete units being provided by the patrol to the naval officer in command. The naval officer need not then worry his mind about the details, knowing he would have ready for his use so many units, just as a skilled workman is kept supplied with sharp tools by his helper.

4. That the ideal patrol boats must eventually be built by the navy. In no other way do I believe the proper number of proper boats can be secured. I would not discourage private building. But thousands of boats would be required for a proper patrol. Such boats must be seaworthy and strong, able to remain out at least six days, capable of comfortably sleeping a double crew, able to mount the proper guns, and able to produce the desired speed. Personally, I do not see how all these requisites can be put into a hull less than 80 feet in length, and nearer 100 feet would be better. For the average patrol boat, I believe a normal speed of 16 knots with a maximum speed of 20 knots is all that will be needed and will be practical. The boats must of necessity be spaced not over a mile and a half apart, as that distance seems to be the limit of visibility of a periscope under the most favorable conditions, so speed is not a prime factor under such circumstances. It would appear useless to give the average patrol boat enough speed to run away from a destroyer, as in most cases the destroyer's guns could end the career of the patrol boat. The primary purpose of the patrol boat being to give the alarm, the question of escape would probably be chiefly dependent on chance, on indifference or preoccupation of the enemy, and on skill of the patrol skipper, rather than on high speed. For certain special work, it might be advisable to have a few very high speed boats, but to install in the average patrol boat the expensive and delicate machinery necessary to yield over 20 knots seems to me unnecessary.

5. That the training of the motor-boat patrol personnel be under the navy and on the boats built by the navy. But, until the neces-

sary number of ideal boats is obtained, such training be on the privately owned motor-boats that can be secured. For such purpose, under present conditions, slow boats can provide at least 80 per cent of the desired training, and numbers of motor-boats which the Navy Department considers not suitable are plenty good enough for training purposes until the ideal craft are available. Moreover, should war come before enough ideal boats are ready, the navy must of necessity utilize everything of any possible use. I know of many small, slow motor cruisers on which I would rather take my chances in a gale than on most of the high speed craft I have seen.

6. That the backbone of the personnel of the motor-boat patrol should be yachtsmen. Knowledge of local waters, keenness of observation and quickness of decision are forced upon the yachtsman by the very nature of his sport. Such men are peculiarly fit for the difficult special work of the motor-boat patrol. With their active cooperation an efficient motor-boat patrol can be established within 12 months. Without their cooperation, it would take five years to attain equal results. The average yachtsman is a man of moderate or limited financial means, and is dependent upon his occupation for his bread and butter. He seldom can leave his occupation for more than two continuous weeks at a time, and in planning for his vacation he must consult well in advance the exigencies of his occupation, the convenience of his associates and of his employers. To successfully interest the average yachtsman, the requirements of the motor-boat patrol should provide for not over 10 continuous days' duty afloat each year in addition to a certain number of week-end periods, and certain instruction meetings during the winter months. The proposed requirement of three continuous weeks' duty afloat each year would bar out 80 per cent of the very men who would be the most valuable for patrol work.

It should be remembered that for every wealthy yachtsman known to the public, there are from 40 to 50 yachtsmen, seldom heard of, of limited financial means but who nevertheless derive fully as much pleasure from the sea as does their wealthy brother.

7. I have no desire to pose as a naval expert, and have no intention of criticising any individual naval officer. I do believe, however, that yachtsmen are more familiar with motor-boats, their needs, their advantages and disadvantages, than are naval officers. That is of necessity so, because few naval officers have had the

chance to live in and handle a motor-boat as yachtsmen have had. For that reason, I believe that the yachtsmen can the more efficiently organize, officer, man, equip and maintain a motor-boat patrol, securing from the navy the needful training and discipline to properly accomplish the patrol duty.

For want of a better name, I call my suggested patrol organization the Volunteer Motor-Boat Reserve. At the head of the reserve should be a naval officer. As understudy or second in command, there should be a reservist with a staff comprising a paymaster, an engineer and a surgeon, all reservists. Were the naval officer taken away in time of war, or emergency, the reservist understudy would be competent to take charge. A man like Mr. Stuart Davis would be just the person for this understudy office.

In each district there would be a naval officer in charge, with a reservist understudy and a reservist staff of paymaster, engineer and surgeon. There could be a similar arrangement in each section.

Then comes the organization afloat. That should comprise squadrons, each squadron to consist of three divisions, each division to contain six patrol boats. Each squadron should have a mother ship. This organization is calculated to provide two divisions on duty, and one refitting and taking on supplies; that is, each division would be on duty six days, refitting three days, on duty again six days, etc. By providing six boats to a division, there would be some assurance of always having five ready for service. The mother ship could be a large motor-boat or a steam yacht, fitted to carry some spare parts, stores, supplies, with a shower bath so the patrol boat crews could get clean, with a drying room to dry wet clothes (this is very important, as dry clothes on a motor-boat at sea are often unattainable), and with some extra sleeping facilities so that an exhausted patrol boat crew may be able to secure some rest. The squadron commander should be a reservist, with a paymaster, an engineer and a surgeon, all reservists. The division commander should be a reservist. The boats would be officered and manned by reservists.

The head of the reserve would presumably be located at Washington, and would report to such officer or bureau as the Secretary of the Navy would designate. He would be chiefly occupied with the many details pertaining to the formation, enrolling in, main-

taining and equipping the reserve. The district and section reserve commanders would assist him in carrying out such work.

The district and section commanders, under the direction of the district commandant, would supervise also the training.

The squadron commanders, while reporting through and looking to the section and district commanders on matters pertaining to training, enrolment, maintenance and equipment, would, when associated with or assigned to a naval force afloat, report to and take orders from the officer in command of such force.

You will note that my suggested organization is formed somewhat on business lines. The patrol duty is a specialty. So much so, and so different in many respects from usual naval work, that I believe it can be better treated as a semi-business organization. In most business enterprises, when experts are called in to solve certain problems, the plan proposed by those experts is usually adopted for want of something better, and after the plan has been tried out it may be modified as circumstances warrant. For the many details of a motor-boat patrol (exclusive of the purely naval features), the yachtsmen at present are probably more expert than others, wherefore their plan deserves consideration and trial. The organization suggested by me is really the crystallization of many opinions from representative and qualified yachtsmen. For it, I deserve only such credit as may be due to my success in formulating their ideas.

This article has more ego in it than I favor or like, but it did not seem possible to set forth the ideas in any other way. That you, and your readers (if you publish this) will pardon it is the sincere wish of the writer.

Respectfully yours,

ROGER UPTON.

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HISTORY OF THE CAPTURE OF GUAM BY THE UNITED STATES MAN-OF-WAR *CHARLESTON* AND ITS TRANSPORT

By FRANK PORTUSACH [1]

In the year of our Lord eighteen hundred and ninety-five in the month of May, I arrived at Guam from the United States of America, via Japan on the schooner *Esmeralda*.

On my arrival I found that Don Emilio Galisteo y Bromenque was the then Spanish governor; I started business running a general merchandise store. In 1896 Don Emilio Galisteo was relieved by Don Jacobo Marina and in 1897 Don Jacobo Marina was relieved by his brother, Don Juan Marina, who had with him as secretary and aid, Don Pedro Duarte Anducar, captain of the marine infantry of Guam which was composed of 55 soldiers and two lieutenants.

On the morning of the 22d of June, 1898, I was awakened by my brother, Don Jose Portusach, who was then in Guam from Europe, having traveled via the Philippine Islands. After making efforts to awake me at my residence, which is now owned by J. K. Shimizu, at Agana, I arose and answered his call. He said to me, "Come to the beach and see those ships there and where they come from." I started with him just about daylight and went to the stone bridge which is close to the present ice plant. After carefully looking through a pair of glasses, I saw a man-of-war leading several transports; I said to him that they were American ships; I did not know the name of the battleship but two of the transports I recognized as the steamships *China* and *Australia;* the other I was not sure of but it later turned out to be the *Zilandia;* at this my brother said, "Do not say anything as I think war is declared between the United States and Spain, if so I will go on board and take with me the Spanish officers in one of your boats,

[1] Mr. Portusach, the author of this article, is serving as judge in the judiciary of Guam.—ED.

and you can go on your whale-boat afterwards." This was done and we all went down to Piti, with the exception of the governor, Don Juan Marina.

The officers with my brother were Lieutenant Commander of the Navy and Captain of the Port, Don Francisco Gutierez, Naval P. A. Surgeon, Don Jose Romero, Captain Pedro Duarte Anducar of the marine corps, and also Don Jose Sixto, civil paymaster.

Just as we arrived at the landing of Piti, the *Charleston* started to shell the Fort of Santa Cruz, but received no response as the fort had been abandoned for a number of years. Don Pedro Duarte said that the man-of-war was saluting the Fort of Santa Cruz, so a note was sent to Agana to have the artillery come to Piti to return the salute, bringing with them the guns such as they had in those days.

The party went in one of my boats to the *Charleston* and I followed them with my own crew in my whale-boat under sail, flying at my topmast the American flag. After the party got on board the *Charleston* I sailed across the bow and then to my surprise some one called out in a very loud voice, "Frank, come on board"; I looked up and saw Captain Hellet, a man whom I had known a number of years before as a whaling captain; at this I made for the lee side of the *Charleston* and went on board. The official party in the other boat was by this time taken down to Commander Glass' apartments. As I reached the deck I was surprised to see a man that I had known before when he was a *Chronicle* reporter in San Francisco at the time I was working for the same firm. He came up to me, shook hands and said, "I am glad to see you here in Guam"; a few minutes later a big, strong man dressed up as an officer walked up to me and said, "What right have you to hoist that American flag at your topmast?" I grinned and said, "I guess I have the right to have that flag up, for if I did not have the right I would not have it there." He said, "Can you prove your right?" I answered, "Yes, sir," and pulling out my naturalization papers as a citizen of the United States from the inside coat-pocket I handed them to him; he looked at them and said, "Well! 22d of October, 1888, Chicago, Cook County, State of Illinois."

Having looked through the documents he turned around and said to me "Follow me." At this moment the official party from the cabin came on deck to go ashore. The officer showed me down to Captain Glass' apartments, and on reaching there the captain

received me with great pleasure. The officer with me handed Captain Glass my papers and after looking at them said, "I am glad to meet you." He told me to sit down, and started in saying that my brother Joe told him that I had some lighters and boats, and asked me if I could let him have two lighters and one boat so as to transfer coal and provisions from the transports to the man-of-war, and he said he would pay me for the trouble. I answered that I would let him have the lighters and boat without any pay, as being the only United States citizen on the island it was my duty to give all aid I could in time of war; the captain thanked me and told me to have them sent out by daylight in the morning of the 23d of June, which I promised him to do. He then called the same officer and told him to take me to an office on board and have my papers copied; if I am not mistaken in the name of the man it was Braunersreuter, however I am not positive that the name is spelled right; the same officer took me to an office and there were two other officers and a typewriter in it. The two officers, to the best of my knowledge, were ensigns and I think their names were R. E. Coontz, later governor of Guam, and Moffatt. Both gentlemen told the clerk to copy the naturalization papers and after doing so they returned the original to me and went on shore.

On my arrival at Piti I found my brother Joe and he told me that all the Spanish officers were under arrest, but they were on parole with the condition to deliver themselves on board the *Charleston* the next morning so that they might be taken as prisoners of war to Manila.

I called my head boatman, Tiburcio de los Santos, who is alive to-day, and several other men and ordered them to deliver to the *Charleston* two lighters and a boat at daylight in the morning; after this I got in my buggy with my brother and came to town.

On the road to Agana, we passed the artillery which had been turned back by their officers as the American man-of-war did not need any salute. In a few minutes we arrived home and my wife, who was an American woman, had lunch ready, this was about 2.00 p. m. My brother, wife and myself sat down to partake of our lunch, and while eating a letter came from Governor Don Juan Marina, and if I remember correctly it read as follows:

Si usted da asistencia a los buques americanos de guerra sera usted afusilado mañana al amanecer en la playa.

El Gobernador,
JUAN MARINA.

The translation of this note is as follows:

If you render any assistance to the American men-of-war you will be executed to-morrow morning at the beach.

(Sgd.) JUAN MARINA.
Governor of Guam.

I read the note and laughed at it, and my wife asked me what was in it, and I told her. She started to cry and said it was our ruination, I said, " Do not worry and cheer up. Do not be afraid of anything for if it comes to the worst I will have the ships take care of you and my children." Then I showed the note to my brother and told him I had already promised Captain Glass the lighters and I was going to send them in spite of the threatening letter that they had sent me. Jose told me that I had better look out.

After lunch I went to Piti, got my boat and crew and went to the *Charleston,* arriving there about 4.30 p. m. with the letter from the governor, Don Juan Marina, to show it to Captain Glass, to find out what could be done. I got an interview with Captain Glass and he invited me to dine on board; during dinner time he told me that he would issue an order to the governor to have the island delivered before daylight, and if he did not comply with the order he would shell the town. This made me very happy, and after dinner we had a general conversation and then came ashore about 9.00 p. m. Arriving at Piti, I told again Tiburcio de los Santos to send the lighters and boat in the morning in spite of all the trouble that the Spaniards would make for me and all that might happen. I came to town and went to sleep with great hope for the future.

The next morning which was the 23d day of June, at daylight I found out that God through his mercy, had delivered the island to the United States of America and at 11.00 a. m. the same day all the Spanish officers and soldiers were taken to Piti, disbanded, and were taken on board the *Charleston* as prisoners of war, by Lieut. Commander Braunersreuter. At 3.30 p. m. troops were landed at Piti, formed in line, and raised the stars and stripes, the glorious old flag, and played the Star Spangled Banner.

I went on board to see Captain Glass, and he asked me if I could take care of the island until some other officers or man-of-war might reach Guam, I being the only United States citizen at that time; I promised Captain Glass that I would do my best; he asked

me if I was in need of aid, meaning soldiers for the island. I answered, "No," as the people are very good here. The next morning which was the 24th of June I went again on board to see the ship go away, but on my arrival at the *Charleston,* Commander Glass told me that one of his crew was missing as some of the officers went to Sumay and they must have left him there. He requested me to try and get the man ashore, which I did. Hoisting my sails I went to Sumay to search for the man, meantime he told me that he would pull up anchor and "heave to" outside the reef and wait for me; I got to Sumay and found the poor sailor sitting on the landing; I told him to get in my boat which he did, and without a moment's delay I sailed back to the *Charleston* to deliver him. When I got there the captain asked me what pay I wanted for my trouble, and I told him the only pay that I desired was that the man be freed from punishment; this was granted, my photograph was taken on deck, I bid them good-bye and came ashore.

After arranging matters at Piti I came to Agana and for a few days I was quite worn out as a result of the great battle that we had had.

In a few days I found out that the Spanish paymaster, Don Jose Sixto, was paying the native soldiers from the city funds, as the *Charleston* did not take them away but set them at liberty. The paymaster did this for the benefit of the public and also for his own protection, as he used to call himself the successor of the Spanish governor without orders from any one.

As Commander Glass did not give me any written appointment I could not interfere with the island treasury nor with the said paymaster, but at the same time I was watching him very closely as he intended to raise the Spanish flag at the Government House at most any time (but did not dare); so he kept his position as administrator of the island treasury.

After the *Charleston* had left for Manila, Don Justo de Leon Guerrero was acting as captain of the town and he had for his aid Don Venancio Roberto and they were in control of the city. I gave them full charge of the affairs of the public and I looked after the affairs of the island.

On or about the middle of July, 1898, the monitor *Monterey* came to port on her way to the Philippine Islands to supply her boilers with fresh water. After this was accomplished she continued her route to Manila. A week later the monitor *Monadnoc*

and the collier *Nero*, bound for the Philippine Islands, came into port to supply their boilers with water and other supplies. I piloted the said men-of-war into harbor and supplied their boilers with water. If I remember correctly Captain Whiting was commanding the *Monadnoc* and Lieutenant Douglas was then an ensign on board. In a few days they were ready to sail for Manila, and the morning they were ready to go out the German man-of-war *Arcona* came to port. I was on board that day, as Captain Whiting told me that he would like me to help him go out.

When it was reported to Captain Whiting that there was a man-of-war in sight he gave orders to clear ship for action; the commander ordered me to go in my whale-boat outside of the reef and try to find out what man-of-war was the one in sight, and if it was a Spanish man-of-war to give him a certain signal on board, and if any other nation to give him a different signal; this was done on account of the day being very calm and hazy. Although it was very trying circumstances, I obeyed orders and ordering my men to the boat I pulled outside of the reef. The *Arcona* coming down about at quarter speed gave me all the chances of the world to spy her, as I had a good pair of sea glasses. It was not long before I could distinguish that it was a German man-of-war and giving signals to the *Monadnoc* I went along side the *Nero* almost as fast as a steam launch, as I had five of my best oarsmen from Piti. The *Nero* steamed ahead as if she was towing the *Monadnoc* behind her. The *Arcona* by this time passed the *Nero* and coming abreast to the *Monadnoc* I heard a commanding voice from the crow's-nest of the *Monadnoc* saying, "Back water and heave to," this was immediately done by the *Arcona*, and the officers of the two men-of-war exchanged visits. I looked upon the bridge of the *Arcona* and saw Mr. Henry Millinchamp as pilot bringing her into harbor, the pilot having boarded the *Arcona* in front of the town of Agana.

After the two men-of-war exchanged visits, the *Nero* and the *Monadnoc* proceeded on their way to the Philippine Islands. I boarded the *Arcona* for business purposes to find out what supplies I could help them with; the paymaster on board said he wanted some cattle, greens, and all kinds of vegetables, so I took the contract to supply the ship.

Mr. Millinchamp and myself were invited to lunch and about 3.00 p. m. we came to Piti and thence to Agana.

On or about the middle of August the steamer *Saturnos* of the McCloud and Co. steamers, which had been chartered by the Spanish Government as mail steamer, made the last trip to Guam, took away with them the wives and families of the Spanish officers that were left here by the *Charleston*. Their husbands had been taken to Manila as prisoners of war. I also turned over to the *Saturnos* my account to the company, being the agent for the same. From here they sailed to the island of Yap, and from Yap to Manila.

On or about the last of August or the beginning of September, 1898, the *Pennsylvania*, I think she was a transport, came into the harbor and the commander came to my store to ask if I needed any assistance; I replied, "No, I can get along without guards or any troops," as the people were of a very peaceful disposition.

In the months of November and December I ordered through the captain of the town, or what they then called "Gobernadorcillo," this word means "small governor," which office was then held by Don Justo Leon Guerrero and who I think had for his aid at this time Don Joaquin Perez (at present time Land Judge), to have the road fixed from Agana to Piti as it was in a terrible condition. Not even a bull cart could very well travel along the road. I told the public that it would be a source of shame to the residents of the island if the Americans should come and find such a road; I promised them that they need not pay taxes the same year if they voluntarily fixed the road and also would patch up the holes in the principal road of the town; further, I promised them to supply them with plenty of food, drinks, such as tuba and besides a couple of big drinks of gin a day for each man, also some chewing tobacco if they would put the road in good condition. This I did to make them feel happy and willing to work, also to show them that I, as an American subject, did not handle them as the old Spanish fashion, also to make them feel that they were freed from the Spanish thraldom and that they had come to be under American liberty and freedom.

The work was started and each Cabeza of the Baranguay of the commissioner furnished so many men from his district each day, until the work was completed. Don Justo de Leon Guerrero, Don Joaquin Perez and myself superintended the work until its completion.

During the construction I established on the road seven different stations for the purpose of feeding the workmen. From Anigua to Chorito one eating place, from Chorito to the entrance of Asan another one, from Asan to Tepungan three eating places and from Tepungan to Piti two; each one of these stations was supplied, according to the number of men, every day with sufficient rice, salt beef, salt salmon and salt pork in barrels, also sufficient tuba was bought and put on the station for their refreshment. At meal hours the men in charge of each station would give every man a big drink of A. V. H. gin and also passed the men their allowance in tobacco; this was done at my own personal expense until the road was completed and finished.

When the road was near completion the Spanish paymaster, Jose Sixto, called at my store one morning and remaining at the bottom of the steps called me out and said, "You are foolish for doing so much work for the Americans, I have the money in the safe to do that work, but I will see myself first in damnation before I let out a dollar to the advantage of the American Government, and if they should come to Guam they will not find any money in the safe or treasury." My temper was aroused and knowing that he was always armed with a revolver I turned into the store to grab my six shooter and told him to wait for me, as I did this he ran away; then I thanked God that I had not committed a crime, but if I had, I would have simply felt that I was doing justice in protecting my honor, my family and my nation and I would have had a clear conscience.

Not having a written appointment from Captain Glass, as I have stated before, I could not interfere with the island treasury; this I feared to do, for if any shortage might occur during the administration of the said Paymaster Jose Sixto I would have been blamed for it, for this reason I let him continue executing his administration as the island treasurer.

The road was completed at last and the people and public of Guam were perfectly satisfied with the way I directed the work; the laborers then were hoping for the Americans to come and none desired to see another Spaniard in the island with the exception of a few sore heads that under the Spanish Government had as much to say as the governor himself.

On December 12, 1898, there was a pilgrimage of the Virgin Mary inaugurated in the village of Sumay, a customary event to

the present day, and of course after church services the main entertainment of the gathering was cock-fighting. At about 2.30 p. m., a Chamorro by the name of Gordo, living in the village of Agat and a Filipino by the name of Alejandro, ex-coachman of Don Pedro Duarte, were at the cock pit and during one of the fights the two above-mentioned parties got into trouble over some betting and the Chamorro, knowing well that this Filipino was trying to cheat him out of 50 cents, slapped him and knocked him down. This I am positive of because they were right underneath the porch where I was sitting with Joaquin Perez. In a few minutes there was a rush of Filipinos against the Chamorros which looked more like a riot than anything else, for every Filipino either had a knife or a gun in his hands. Before Joaquin Perez and myself could jump off of the veranda where we were sitting, to try and stop the fight, a couple of Chamorros were stabbed, I think one of them by the name of Lino Mendiola residing at present in Agana, the other I do not remember. I jumped off of the veranda and Joaquin Perez followed me and we tried to stop the trouble but instead of succeeding in our endeavor one of the Filipinos made a run for me with a dagger to stab me; at this I heard some one say, "Look out, Frank," and as I turned I knocked the dagger out of his hand and hitting him with my bare fist sent him flat to the ground. As he tried to get up feeling his pockets as I supposed for another knife, Juan Perez (a) Bilango gave him a blow with an aabang stick almost killing him. At this I turned around and saw that one of the Filipinos had seized a lance from the Chamorro patrolman and was going to stab Vicente de Borja, the present commissioner of Sumay, under the porch where I had been sitting, but before this Filipino succeeded in stabbing Mr. Borja some of the other natives knocked him down and took the lance away; by this time someone brought me my six shooter that I had left at Nicolas Diaz's house where I had been staying. Immediately when the Filipinos saw that I had the gun in my hands the bunch begged for mercy. Most of these Filipinos were old convicts and criminals deported from the Philippine Islands to Guam under the Spanish administrations, and during their stay at Guam had always caused trouble among the public.

In a few moments after the arrival of my revolver, I, with the aid of Joaquin Perez, picked up the wounded and put them in a house close by, also took the rest of the Filipinos that we could

get hold of amounting to about 18 or 20 and put them in the same house; I told them that if they remained quiet I would take care of them and bring them safely to Agana the next morning, but if they raised any more trouble the natives would be apt to take the law into their own hands. They remained quiet in the house until the next morning. Of course I had them guarded in case they should try to do any damage during the night. The next morning Mr. Vicente de Borja took his boat and the two of us took the Filipinos to Piti to deliver them to the native patrol to bring them up to jail, and then we returned to Sumay.

December 25, being Christmas Day, I summoned the captain of the town, Don Justo de Leon Guerrero, his deputy-commissioner, Don Joaquin Perez Cruz, and all of the rest of the commissioners of Agana to meet at my store for the purpose of coming to an agreement how we, the representatives of the United States Government, were going to run Guam from the beginning of the year. During the meeting, a majority decided that another meeting would be held at Padre Palomo's house and appoint Padre Palomo president of said meeting, and that whatever might be decided it would be carried out.

On the evening of December 31, New Year's Eve, the commissioners of Agana, aided by Padre Palomo and myself, went to Padre Palomo's residence, the house at present occupied by the moving picture show, to decide the question of whether or not Don Jose Sixto should be removed as city treasurer or in other words to discharge him, also to talk over the fact that some of the native soldiers had reported to me that Don Jose Sixto was going to raise the Spanish flag on the first of the year.

Before I proceed in explaining what we did at the meeting we carried out at Padre Palomo's residence, I will state briefly what happened a few days after I got the notice that Mr. Jose Sixto was going to hoist the Spanish flag. I went around town among my acquaintances, and between them and my boatmen at Piti I managed to gather in the yard of my residence over 350 men, most of them with their own rifles and those that had none I supplied; should Mr. Jose Sixto dared to hoist the Spanish flag the next morning I would have attacked him.

At the meeting at Padre Palomo's residence, he acting as chairman, we decided that under all circumstances Mr. Jose Sixto must be relieved from the treasury, as by this time I had found out that

he had divided the treasury money among his employees and himself. At 12.30 a. m. of New Year's Eve I was called from the meeting at Padre Palomo's residence to act as surgeon to sew up a wound on the buttock of a man named Antonio de los Santos, that was inflicted by Luis Leon Guerrero (a) Silvas with a shoemaker's knife; I went to the store and did my best for the man's recovery and he is well to the present day.

The next morning being New Year's Day of 1899 at 6.00 a. m. I sent one of my boatmen by the name of Juan Fejerang to see if the Spanish flag was hoisted on the Government House, but he came back to the yard saying that there was no flag raised. At 8.00 a. m. the same morning I sent Lucas Fejerang again to see if there was any flag raised, but in a few minutes he came back and said, " No "; I did this with the intention that if the said Jose Sixto succeeded in raising the Spanish flag the first of the year, I would make an attack against him and his followers and put them in confinement until I could get communication with some United States officers or ships that might come to Guam. Later on I found out that some of the native soldiers had told Mr. Jose Sixto of the preparation I had made, so they did not dare to hoist the old Spanish flag, so my volunteers went home. The same morning I went to Padre Palomo to inform him of the proceedings that I was taking against Mr. Sixto; before reaching a decision or coming to any conclusion the announcing bell on the hill, where the Spanish magazine was located, started to ring, signaling that there was a ship in sight. Padre Palomo and myself prepared to go on board, and when we got there we found out that it was the collier *Brutus;* I do not remember the captain's name.

Once on board Padre Palomo, Jose Sixto, myself and others I do not remember, stated to the commander the situation of Guam; after a long discussion I told the commander to appoint someone to look after the city, I having so much business to attend, and if I am not mistaken he appointed Don Joaquin Perez until the *Bennington* came.

On or about the last of January, 1899, the cruiser *Bennington* commanded by Captain Taussig came to Guam, and in the morning of the 1st and 2d of February the American colors were raised by Captain Taussig at the Government House.

When the *Bennington* left Guam on about February 20, Mr. Joaquin Perez was left in charge of the island until the collier

Nanshan, commanded by Captain Stovel, Ensign Kaiser, U. S. N., came; they remained in harbor for a number of months, Mr. Kaiser was acting temporary governor during the time that he was here; he had as his aid Mr. Joaquin Perez.

On the beginning of March the steamer *Elcano* came from Manila with the Macabebe troops to be taken to Saipan, and also to take there some of the trash and rubbish belonging to the Spanish Government that were here. She brought Captain P. M. Duarte who remained in Guam. On the 10th or 12th of April the battleship *Oregon* came to Guam bound for Manila, and towards the last of April the schooner *Esmeralda* from Japan called at Saipan and there received orders from the American Government from Manila to take all the munitions of the Spanish garrison at Agana and take it to Saipan, and when the orders were delivered to the acting governor, Don Joaquin Perez, they were complied with, and everything belonging to the Spanish Government was sent to Saipan by the schooner *Esmeralda.* Joaquin Perez was relieved by William Coe on or about August, 1899, by orders of Ensign Kaiser, and Mr. Coe acted as governor until the *Yosemite* came with Captain R. P. Leary on or about November.

The paymaster, Jose Sixto, also went to Saipan, but before leaving Guam the acting governor made him pay his shortage to the island treasury and also his employees, the interventor and the clerk, Don Joaquin Diaz, paid back what Mr. Sixto had given them as shares. Joaquin Diaz had not spent the money that he had received from Mr. Sixto. Mr. Sixto having already spent what he got from the treasury, he borrowed some money from Padre Palomo, Padre Francisco Resano and others in Guam.

When Governor R. P. Leary took charge of the island he brought with him a command of soldiers with Major Kelton, Lieutenant Carpenter, Lieutenant Jonas, Lieutenant Collins and Lieutenant William B. Stafford, U. S. N., as his aids.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A FEW HINTS TO THE NEW NAVIGATOR

By LIEUTENANT H. R. GREENLEE, U. S. Navy

Inquiry by the commanding officer of the U. S. S. *Montana,* as to the sorts of duty that the various members of the classes of student torpedo officers have performed since their graduation from the Naval Academy, has shown that a remarkably small percentage of them have had experience as assistant to the navigator; and inasmuch as many of these officers, upon their graduation from the torpedo class, will be assigned to torpedo craft, where they will be required to perform navigating duty, it was considered desirable to give as many of them as practicable as much experience along navigating lines as the movements of the ship would permit, keeping in mind the fact that this navigating work will not interfere with the course of torpedo instruction, as the torpedo instruction is not carried on when the ship is making a passage.

A suitable equipment of nautical instruments, charts, sailing directions, light lists, nautical almanacs, etc., was procured from the Bureau of Navigation, for the exclusive use of these officers, and a course of practical work was laid out by the navigator.

Since this equipment was received, but one sea passage has been made, viz., from New York to Mordazo Anchorage, Gulf of Guacanayabo, Cuba, but it is believed that the practicability and desirability of this instruction have been fully demonstrated.

As was expected, errors were made, some showing lack of conception of the principles of the work involved, and others a lack of knowledge of how and where to obtain certain necessary and desirable knowledge, and for these reasons this paper is written.

It is not purposed to discuss in detail the art of navigation, for that would be too voluminous, but it is desired to touch briefly upon the most important points of practical navigation, in the belief that such points will assist the class in overcoming the faults shown during the last passage and that they may be of assistance to some officer starting his first navigator's cruise.

Portions of the art of navigation can be obtained from books, but a very important portion can be obtained only from experience, assisted by the experience of others. The sooner he ascertains just what must be acquired by experience, and then acquires it, the sooner will the new navigator become an efficient unit of the department organization of the ship.

While these notes may easily be adapted to the condition of a ship cruising with the fleet, for present purposes it is assumed that the ship is cruising singly, and the departure land falls and arrival may be timed as seen fit within the normal limits of the urgency of the ship's orders, and the speed that may be necessary or desirable. However, every navigator must be prepared to make sea passages, departing at times and at speeds over which he has no control, and in fact this should be practiced.

The purpose of this paper, involves only the duties of the navigator in:

1. (a) Preparing the navigation department for a sea passage, and (b) the information that must be acquired before going to sea.

2. Acquiring the information that the navigator must acquire while at sea, with a brief discussion of how and why.

1. (a) To prepare the navigation department for sea, the navigator must:

(1) See that the steering gear is in order.

(2) See that the lead lines are checked.

(3) Have the sounding machine set up, with the tubes at hand, for it is not always known, ahead of time, when the sounding machine will be wanted.

(4) Have the patent log and log line aft, and ready to put over and be sure that the port log line is not put over the starboard side, for if there is a percentage error, it would be applied to the wrong log reading. It is a good plan to have the rotator encased in a box, except when actually over the side, in order that the vanes cannot be bent by knocks when transporting it.

(5) Have the charts that will be used corrected to the latest notice to mariners. The navigator should correct the charts himself for two reasons: (1) accuracy and (2) conversance with the corrections that are made.

(6) Start the gyro compass, if there is one, two and one-half hours ahead of the hour set for getting underway, and check it when it is thoroughly settled, by azimuths of the sun. If the sun

is not available, it may be checked by taking bearings of three charted objects, and plotting them on the chart. At least three observations, at from 10 to 15 minutes apart, should be taken to determine if there is an oscillation. The compass may, in an emergency, be started and settled within one degree of the meridian, in one hour's time, but this should not be practiced.

Even if there is a commissioned officer on board taking immediate charge of the compass, the navigator should study it and be thoroughly familiar with its wants and ills, for with intelligent care it seldom requires more than the application of mature common sense.

(7) See that the sextant and a stand-by sextant are in adjustment. Attempts should not be made to remove a small amount of index correction, for it will not affect the accuracy or the rapidity of the work.

(8) Do not hesitate to take a local pilot, if there is one to be had, if there is the slightest doubt about the need for one. He is a good accident insurance policy, and much may, probably, be learned from him, both about the channel and the local traffic. The navigator should telephone for the pilot, and give him plenty of time to get on board, so that sailing need not be delayed by waiting for him.

There are other details to be looked to before getting underway, but as they do not materially affect ship control or the movements of the ship, they do not come within the purpose of these notes.

1. (b) Before getting underway the navigator should acquire the following information:

(1) What charts will be used.

(2) What courses will be steered, and what distance will be made good on each course.

(3) Total distance to be run.

(4) The best time for departure, and the state of the tide.

(5) The speed of the ship, in revolutions per minute and knots, best suited for making land falls, and timely arrival at the port of destination.

(6) What land or aids to navigation will be sighted, and at what time each will be sighted.

(7) What particular dangers are to be avoided.

(8) Look up the characteristics of all land, light houses, light ships, lights, and fog signals.

(9) When, if at all, should the sounding machine be used.

(10) What observations should be taken and at what times.

(11) What stars will be available for morning and evening observations.

(12) What currents may be expected during the passage.

(13 What per cent error should be applied to patent log readings for dead reckoning purposes.

(14) State of tide at the port of destination at the time of arrival.

It may be stated that at least a portion of the above information may be acquired after getting underway, and sometimes due to urgent orders, it must be; but, the navigator who goes to sea with the above information in his note-book, on his charts, and in his mind, is absolutely prepared for the passage, and will be prepared to the best of his ability, for any contingency or emergency.

The acquiring of the above information requires considerable thought and study, and should ordinarily be taken up in the order given, and along general lines as follows:

(1) What charts will be used.

The list should include:

(a) A general chart or the chart of the least extent covering the whole passage. This is desirable for the purpose of giving a perspective of the passage.

(b) Charts of a more moderate extent on which the actual work is carried.

(c) Charts of the largest scale, *i. e.*, of the least extent on which the courses should be laid, for the purpose of searching out more thoroughly and carefully any dangers to navigation.

(d) The largest scale harbor approach charts.

(e) The harbor entrance charts showing the entire channel on one chart, this to be used for perspective only.

(f) The largest scale harbor entrance charts.

(g) The largest scale harbor charts.

(h) The anchorage chart.

Anchorage charts should never be used for navigating purposes. Good practice is to transfer the berths from the anchorage chart to the harbor chart in use, for then the navigator is ready for a berth assignment by the commander-in-chief or the senior officer present, in case the assignment is not made until shortly before anchoring.

Charts should be referred to as H.O. 942, C.S. 1108, B.A. 1138. The consecutive numbers should not, ordinarily, be used, their use being for convenience in filing only.

Prior to getting underway, the charts to be used, should be selected and broken out, the light circles drawn in with black and red water-proof ink. A good plan is to use black ink for white lights and red ink for red lights and red sectors of lights. The name of each chart should now be written on its outside margin, toward the front, as it lies in the portfolio, in order that when a particular chart is wanted, the selected ones may be run through and the chart desired picked out, without reference to the chart catalogue and without unfolding the charts. Now arrange them in the order in which they will be used. When the study of them has been completed, place them in a drawer, empty portfolio, or in fact any place where they will be out of the way but safe and accessible.

The Pilot Chart and Hydrographic Bulletin should be consulted for the latest information on obstructions and the various valuable information that they contain. All obstructions, derelicts, etc., that may have been reported near the course to be made good, or that may have been carried near the course, should be transferred to the charts that will be used. The pilot chart should also be consulted for lines of variation, for they generally differ from those shown on general charts and are usually more nearly correct.

(2) What courses will be steered, and what distance will be made good on each course.

The sailing directions should now be carefully studied, for in most cases they furnish information as to standard routes to be sailed, with the distances both for heavy draft and light draft ships. These courses and the distances on each course should be laid down on each chart to be used, and should be sailed closely, except where the presence of a wreck or other obstruction renders such procedure impracticable. In any case the sailing direction courses should be retained on each chart for reference. If desired, they may be drawn in with water-proof ink, and thus save work in preparing for a similar trip at some time in the future.

Sailing direction courses should always be drawn in with water-proof ink on harbor entrance charts.

(3) Total distance to be run.

This should be very accurately computed, for by combining it with the time of departure and the speed of the ship, the time of arrival may be obtained, the necessity for which is obvious. It is also obvious that the total distance should be the distance from anchorage to anchorage.

(4) The best time for departure and the state of the tide.

(5) The speed of the ship, in revolutions per minute of the engines and in knots, best suited for making land falls and for arrival at the port of destination.

(6) What land or aids to navigation will be sighted, and at what time will each be sighted.

The three are closely associated, particularly for a ship on independent duty. Sometimes the navigator will not be asked for information on this subject, but he must study and be prepared to give the information if it is required.

The state of the tide at the port of departure or destination need not, necessarily, have anything to do with the time of arrival or departure, except where the channel is narrow and tortuous and hence made dangerous by currents, or where the depth of the channel is such that it is necessary for the ship to make the passage at high water. However, the advantage of going in on the flood and out with the ebb is obvious.

In the back of the tide tables are diagrams and directions for their use, giving the navigator information as to how to get the most benefit from tidal currents at our principal ports. Information about tides is also found in the sailing directions indexed under "currents."

The limits of the time of arrival should now be determined. Frequently the port of destination may be entered at night as easily, or more so, than in the daytime, in which case there will be no limit as to time of arrival. Again, the port of destination cannot be entered at night without grave danger. Again, there may be a narrow, dangerous, badly lighted channel to be passed, making a daytime passage practically imperative. Therefore, combining this with a practical time for departure, a suitable ship speed may be computed that will conform to reasonable limits of economy of coal and personnel and the urgency of the service of the ship.

The times of sighting the aids to navigation, land, etc., should be estimated in advance of going to sea, for it must be done sooner

or later; as a matter of fact it will be done again after getting to sea, nevertheless it will be checking the work rather than original study. The work at sea should be principally confined to "Where is the ship."

(7) What particular dangers are to be avoided. After the courses have been laid on the chart, scan the charts carefully and red pencil them, *i. e.*, draw a red circle around every shoal or obstruction that lies within several miles on either side of the course. This is desirable, for after getting to sea a study of the chart will be unnecessary, a glance at it will suffice to locate dangers.

(8) Look up the characteristics of land and all aids to navigation that will be sighted, together with the fog signals of such aids.

The land characteristics should be looked up in the Sailing Directions or Coast Pilot. The characteristics of the aids to navigation should be looked up in the light list and all correction slips pasted in the light list should be checked. A convenient method is to have made, a type written copy of the day, night, and fog signal characteristics of every aid to be sighted. By this means the navigator may carry a copy in his pocket for ready reference. He may turn one over to the officer of the deck, and one should find its way to the captain for his reference, as well as for his convenience when he writes the night order book.

The characteristics given on the charts, are usually correct, but should never be depended on, unless they have been checked with the light list.

(9) When, if at all, should the sounding machine be used.

The sounding machine has its greatest use in cloudy or foggy weather, if the ship is on soundings; and it is also of great value when steaming in localities where strong currents are known to exist, as for example, the run from Cape Cod to Nantucket Shoals Light Vessel. The run from Cape Cod to Nantucket Shoals Light Vessel is not, however, a very good example of current sailing on the sounding machine, for the depths of water are not well known or are poorly charted; and also, when approaching the light vessel from the northeast more than one "fit" for the line of soundings can usually be found.

To run on the sounding machine, take soundings half hourly and plot them by dead reckoning on a piece of tracing cloth, using the

last fix as a point of departure. Place the tracing cloth on the chart and see if the soundings obtained correspond with the depths by chart. If they correspond, try to find a second "fit." If they do not correspond, move the tracing cloth around in the effort to find a "fit." In many localities the currents can be more or less accurately computed from current charts in the sailing directions, and the soundings should now be plotted by dead reckoning on another piece of tracing cloth, making allowance for the computed current.

It is well to bear in mind that any near fix obtained by soundings should be used with great caution, except where the soundings by machine definitely establish the position, on account of marked changes in the depth of water, which depths could exist in no other place in the vicinity, as for example, the mud gorge in the approach to New York. The mud gorge is a narrow channel extending in a northwest and southeast direction with depths of 40 fathoms where the surrounding depths are not more than 30 fathoms.

On approaching soundings in thick weather, the sounding machine should be used constantly, for the distance off shore can thus be accurately determined, and frequently the first depth obtained, coupled with the dead reckoning, will give an absolute fix.

It is sometimes desirable to follow a curve of depths, as in the run by the inside route from Cape Hatteras to Florida. This can be done very handily by using the sounding machine.

(10) What observations of heavenly bodies should be taken and at what times.

For a day's work the following observations of heavenly bodies should be taken:

(a) Star observations at morning twilight.

(b) Sun observation when the sun is on the prime vertical in the forenoon, or as soon as it has sufficient altitude.

(c) Sun observation in the forenoon when the sun bears 135°.

(d) Ex-meridian observation of the sun.

(e) Meridian altitude of the sun.

(f) Sun observation in the afternoon when the sun bears 225°.

(g) Sun observation in the afternoon when the sun is on the prime vertical, or at such time before as necessary for it to have sufficient altitude.

(h) Star observations at evening twilight.

The times of the forenoon and afternoon observations of the

sun are noted above for the condition of the ship being in north latitude, and having the latitude greater than the declination of the sun if they are of the same name.

It must be borne in mind that under certain conditions of latitude and sun's declination, the sun will be practically in the prime vertical all day; again it will be north of the prime vertical all day; and again it will be south of the prime vertical all day.

The principal object to be attained in deciding when to take sun observations, is to find out when, if at all, the lines of position may be obtained for a longitude line direct; the noon line is of course a latitude line; and the mid-forenoon and mid-afternoon lines should be taken at such times as to make the greatest possible angle with the other two lines.

Frequently when making short passages no observations of heavenly bodies are necessary. On the other hand, if there are known to be currents in the vicinity, a safe land fall may be planned by arranging the time of departure in order that a fix may be obtained a short time before the land fall.

(11) What stars will be available for morning and evening observations.

The navigator should be thoroughly familiar with the constellations that contain the stars that are suitable for navigational purposes. Before going to sea, he should, if necessary, go on deck at evening twilight and at morning twilight and observe their locations in the heavens, in order that each can be recognized on sight.

For the purpose of studying the stars and ascertaining when each will be visible, a planisphere is desirable and is inexpensive.

(12) What currents may be expected during the passage.

The currents to be expected during the passage must be carefully looked up, for frequently when currents are strong and the sea room is limited, allowance must be made for them. If the currents are not allowed for, the estimate should nevertheless be made, in order that the probable set and drift will be known, for it may be necessary to make the entire passage on dead reckoning and soundings.

(13) What per cent error must be applied to patent log readings for dead reckoning purposes.

If the error of the patent log is not known, it should be ascertained as soon as possible, by checking it on a measured mile or

by running from abeam of one landmark to abeam of the next in a locality where there is known to be little or no current. A comparison between the run by patent log and the run by chart will give a percentage error.

Many navigators do not use the patent log, they using revolutions entirely for working up the dead reckoning position; but unless the log interferes with the maneuvering of the ship, its use is advised for a check if for no other purpose.

A ship's speed will usually vary somewhat under the varying conditions of draft and trim. An example of this variation is shown by the *Montana*. With normal trim and draft, the *Montana* will make 13 knots for 65 revolutions per minute, but if the ship is down by the head two or three inches, she will make thirteen and four-tenths knots for 65 revolutions per minute.

(14) State of the tide, at the port of destination, at the time of arrival.

This must be known in advance for it may be necessary to regulate the time of the ship's arrival, on account of channel depths, or the fact that the channel may be too dangerous for the passage except at slack water.

If the harbor can be entered regardless of the state of the tide, the information is, nevertheless, desirable for ship control on entering and must be known if the anchorage is crowded or if the ship must be moored.

(2) Acquiring the information that a navigator must acquire while at sea, when off soundings.

The U. S. Navy regulations require that the navigator shall obtain and report to the captain, the position of the ship at 8.00 a. m., noon, and 8.00 p. m., and at such other times as the captain may require it.

The navigator in making a position report to the captain should include in that report the following:

(1) Latitude by dead reckoning.

(2) Longitude by dead reckoning.

(3) Latitude by observation.

(4) Longitude by observation.

(5) Courses made good per gyro compass and per standard compass; and the distance made good on each course, since noon or some other specifically stated time.

(6) The total distance made good since noon or since some other specifically stated time.

(7) The average knots made good since noon or since the last fix.

(8) The current experienced since noon or since the last fix.

(9) The percentage error of the patent log.

(10) The error of the gyro compass.

(11) The error of the standard magnetic compass.

(12) The assumed variation obtained from the chart.

(13) The resulting deviation of the standard magnetic compass.

(1) The latitude by dead reckoning.

(2) The longitude by dead reckoning.

For the purposes of establishing a position point by computing "A" by the Haversine Cosine Method, accurate dead reckoning work is not necessary; however, no opportunity should ever be neglected to obtain as accurate a dead reckoning position as possible.

Ships frequently have to make a complete passage by dead reckoning, and for this reason the navigator should at all times practice dead reckoning to the maximum extent, by studying and applying currents and estimating the over ground speed of the ship by every known method. Practice in this will be found to be of inestimable value, for in addition to all of its other advantages, it will teach the navigator that when relying on dead reckoning, extreme caution must be exercised in approaching land or dangers.

(3) The latitude by observation.

(4) The longitude by observation.

The latitude can be directly obtained only as follows:

(1) By observation of a heavenly body, when it is on the meridian.

(2) By observation of Polaris.

(3) By the reduction to the meridian of the sun or a star.

The longitude can be directly obtained only as follows:

(1) By observation of a heavenly body, when it is on the prime vertical.

Latitude and longitude both may be obtained from the intersection of two or more lines of position, which were obtained by observations of two or more heavenly bodies, the observations being taken as nearly simultaneously as possible, and the lines of position run up or back by dead reckoning to any one of these lines of position that may be selected.

An absolute fix can be obtained only at a. m. and p. m. twilight, when two or more stars are available for observation. All other

positions involve dead reckoning, which may be more or less accurate, for obtaining either the latitude or the longitude, or both. Therefore it will be seen that the latitude and longitude by observations at 8.00 a. m., noon, and at 8.00 p. m. will, either or both, invariably involve dead reckoning.

To obtain a position by observation, the following work should be done.

(a) At morning twilight, at least three stars should be observed if they are available. One or more in addition should be observed, but to be held in reserve in case they are needed for establishing the fix.

Polaris should always be included in the list of stars observed, for it is the only one from which the latitude can always be computed, and the computation (Nautical Almanac Method) is very simple.

(b) Observe the sun in forenoon when it is on the prime vertical for a line of position, as the longitude will then be obtained direct.

In northern latitudes and in the winter, it is not possible to observe the sun when it is on the prime vertical, therefore it should be observed as soon as it is from 12 to 15 degrees high.

(c) Observe the sun in the forenoon at about 10.45 a. m. for a line of position if the time is available.

This line of position is of particular value when current sailing, for obtaining the noon position by observation.

(d) A few minutes before noon, take an ex-meridian observation of the sun for the noon latitude.

This observation is necessary when cruising with the fleet in order that the forenoon lines of position may be run up to noon and the latitude and longitude obtained in advance for the noon position signal.

At local apparent noon, observe the sun for the noon latitude.

This observation should be made to check the latitude obtained by the ex-meridian observation.

(f) Observe the sun for a line of position at about 1.15 p. m., if the time is available.

This observation should be made principally for running back to noon to check the noon longitude as well as for running up to the last sun line of position taken during the day.

(g) Observe the sun for a line of position when it is on the prime vertical or before it gets below from 12 to 15 degrees of

latitude. The principal use of this line of position is to combine it with the noon line or with the early afternoon line for running up to 8.00 p. m. in case there be no star observations at evening twilight.

(h) Observe stars at evening twilight similarly to the observations at morning twilight.

The perfect conditions and times for an observations are when the sun bears 90°, 135°, 180°, 225°, and 270°.

Unless the navigator knows from experience that his observations are always accurate, he should take at least three, at such times that a check on the accuracy may be obtained by a comparison of the time differences and of the altitude differences.

Doubtful observations should never be computed unless a near line of position will partly serve the purpose, for they tend to destroy confidence in the previous work.

The index correction should be checked before every observation if the sextant is laid down or subjected to any possible jar.

Every observation should be computed by the "Haversine Cosine" method, except those of Polaris, and the ex-meridian and meridian altitude of the sun.

At least every time that the sun is observed for altitude it should be observed for compass error; for, having the watch time and local apparent time difference, the compass error may be computed without table entry or computation, other than the entry of the azimuth tables.

(5) Courses made good per gyro compass and per standard compass, and the distance made good on each course, since noon or some other specifically stated time.

(6) The total distance made good since noon or some other specifically stated time.

The information called for under these heads is usually of general interest only; although, at times, it becomes most important, and is necessary for a full and complete position report.

The total distance from the port of departure to noon and from noon to noon, and from noon to the anchorage should be obtained for entry in the columns of the log for convenience in making up the cruising report.

(7) The average knots made good since noon or since the last fix.

No opportunity should be overlooked for obtaining the average knots over ground, for a part of the information regarding currents is derived from this and above all, the information is necessary for the accurate running up or back of lines of position, and this should always be used in preference to the run by revolutions or by the patent log.

(8) The current experienced since noon or since the last fix.

The current experienced is of great importance, for it must be applied in running lines of position and if it is sufficiently strong, it will frequently require a change of course to compensate it.

(9) The percentage error of the patent log.

The percentage error of the patent log should be computed from fix to fix for comparison of the run by log with the run by revolutions; it is of immense value under various conditions.

(10) The error of the gyro compass.

The necessity for knowing the error of the gyro compass and if it is oscillating, is obvious.

(11) The error of the standard magnetic compass.

(12) The assumed variation obtained from the chart.

(13) The resulting deviation of the standard magnetic compass.

The standard magnetic compass and the gyro compass should be checked every 15 minutes to detect any relative change of ship's head, which would indicate, (1) an oscillation of the gyro compass (2) that the gyro had left the meridian due to heavy weather or other cause, or that the magnetic compass was being affected by some local magnetic disturbance.

As close information of the magnetic compasses as possible should be kept, for the navigator never knows when he goes to sea, but that he may have to use them during the passage. Errors should be obtained by observations of the sun or stars with the gyro compass repeater, and thus obtain the true head and then comparing the head by magnetic compasses with the true head to obtain the magnetic compass error. The resulting deviation should be checked with the table of deviations.

"PILOTING"

Currents should be studied very carefully and applied or compared with the actual current encountered on every passage no matter how short, for the navigator who does this will be very

much more competent when in a fog, snow, or heavy rain, than he otherwise would be. Above all he will know his limitations.

The sailing directions and tide tables give very accurate information of currents, and usually local tide tables can be purchased which give even more complete information for that particular locality.

Courses should always be laid, giving a reasonable margin of safety. Buoys should be regarded with caution for they are usually more or less out of position, and are always subject to being out of position, particularly in localities of strong currents.

Valuable information of local conditions in unfrequented localities can frequently be obtained from the masters of merchant ships.

When piloting, the ship's position can be fixed by the following methods:

(1) Bearings of three navigational aids or prominent charted objects on shore or tangents of land.

(2) Bearings of two navigational aids or prominent charted objects on shore or tangents of land.

(3) A bearing of one navigational aid and a range-finder distance.

(4) Two or more bearings of the same navigational aid or charted object with the course and distance run between.

There are other methods that may be used for fixing the position of the ship, but of all the known methods, those mentioned above are the most commonly used, and are adequate, and should be used in the order in which they are given.

A fix by three bearings is not only an absolute fix, but the plotting is checked and the error of the compass is more or less accurately observed. This method should always be used if possible.

A fix by two bearings is good if the compass error is accurately known, but it does not give a check on the work nor the compass.

A fix by one bearing and a range-finder distance is good, provided the distance to be observed is within the range-finder limit of reliability. This method, however, frequently fails at night as the flashing characteristics of many lights make it impossible to obtain an accurate range-finder distance.

When it is impossible to obtain range-finder distances recourse must be had to bearings with the course and distance run between

them. This method at best is only an approximation, for the distance run, or course made good is almost invariably influenced by currents.

If the ship be in a fog, heavy rain, or snow, and is approaching dangers when the position is not accurately known, a good plan is to determine the maximum limits of the possible position of the ship, draw a circle around it and then lay a safe course from the extreme nearest the approached danger. The position circle should be carried along and all parts of it protected from danger until such time as a fix, or sufficient information on which to reduce the limits of possibility and probability, can be obtained.

When piloting, the ship's position should always be carried along by accurate plotting. Particular care should be exercised in getting an accurate fix immediately before and after changing course. The ship's advance and transfer should be known and applied when changing course in confined waters, *i. e.,* changes of course should be made on a bearing of a charted object located as nearly abeam as possible, and the bearing should be so selected that the advance will place the ship on the new course and in the position which was selected when the chart study was made.

When near land or shoals a fix should be obtained at least often enough so that the maximum attainable current in that locality could not drift the ship into danger without warning.

Every opportunity should be embraced to obtain and use a leading mark when passing through narrow channels, *i. e.,* select a bearing of a charted object, which, if this bearing be maintained, will lead the ship past the dangers. This will give a constant check on the ship's safety without recourse to plotting. A bearing of an object astern serves the same purpose.

The danger bearing is of immense practical value and should be used whenever occasion permits.

When approaching land, buoys, light ships, or light houses that it is desired to sight, set the pelorus or azimuth circle for the bearing on which the object is expected to be sighted and thus confine the search to a small arc of the horizon.

When changing course near land the new course should be sighted with the azimuth circle or pelorus, as a precaution against error which might have been made in laying the course or of the officer of the deck in setting the course.

After each passage the navigation work of the passage should be back checked, for the purpose of noting unexpected conditions obtained and for noting any faults in the plan for the passage, for it is principally by this means that the navigator acquires the fund of information that he must possess to be a successful unit in the ship's organization.

In conclusion the navigator should always remember that:

(1) He is the only officer on board ship who must do all of his own work and can rely on no one but himself.

(2) He must do all of his own work carefully and painstakingly, for a little carelessness may result in grave danger to the ship.

(3) He should never take an avoidable chance, for he has to take enough chances without doing so deliberately.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SOME PRACTICAL HINTS IN NAVIGATION.

By LIEUT. COMMANDER F. L. OLIVER, U. S. Navy

It is the writer's desire to bring to the attention of other officers any of the following practical navigational ideas which may perhaps not have heretofore come to their notice.

Many of these points were obtained from officers who will doubtless be surprised to see their own pet schemes in print without due acknowledgment being made. Truth is, memory is a treacherous thing and the real inventors have in many instances been forgotten. A general tribute is hereby made to all who recognize their handiwork.

GYRO COMPASS REPEATERS

More frequently than is realized, it will be found that the lubber's line of a wing repeater gets out of parallel with the ship's fore and aft line. The result is that all bearings and azimuths taken with a repeater so in error are inaccurate the amount that the lubber's line is right or left of where it should be. Tram up the standard compass—it will usually be found to be correctly placed—and use it as a bench mark. When alongside a dock, take relative bearings of a fairly distant object by standard and by repeaters. If done elsewhere and the ship is swinging at all, the bearings must naturally be simultaneous. Check together the azimuth circles used. Should a repeater be found out of line, there is nothing to be done except to erase the lubber's line and draw a new one in the proper place, unless some means of adjusting the whole repeater has been fitted. The writer had made on board and installed, a sliding block with adjusting screws by means of which the forward knife edge of a repeater can be set over several degrees either way. This method is far preferable to changing the lubber's

line, because the latter scheme throws the dead stop in the repeater out of adjustment, preventing synchronizing from the switchboard. When satisfied the line is in proper adjustment, take and record a careful relative bearing of the jack-staff for use in future checking up.

A glossless black paint applied to the glass of a wing repeater, covering a circle about 4½ inches in diameter, prevents most of the glare from being reflected from the glass into the eyes when taking azimuths.

When the azimuth circle moves in jerks, the time for applying a little oil to the outer rim of the compass has already passed.

Should the celluloid circle under which the repeater card moves warp and cover too much of the graduations, the repeater will have to be opened and the celluloid trimmed to proper size. Before this work is done though, most of the graduations will have probably been worn from the card. A careful worker can remark the graduations, using a drawing pen and waterproof drawing ink. Be careful not to trim away too much of the celluloid and when replacing the bezel glass great care is necessary to exert a gradual setting up alike of all screws. Otherwise a broken glass is sure to result.

Many of the older repeaters are poorly hung in their gimbals and are not at all inclined to hang level. A little redesigning on board will help a great deal. Substitute knife edges for round bearings and secure a heavy collar on the stuffing box at the bottom of the repeater. The observatory furnishes these collars on requisition.

Articles dropped inside a repeater mount are recovered with difficulty. A neat little door at the bottom of the mount solves the recovery question.

Some wing repeater covers fit too tightly to be removed easily. A little work by the coppersmith brings relief. Also some covers are fitted with buttons for handling them. The coppersmith can put on handles which help to save time and temper. The handle is convenient to slip over a hook on a near-by lower rail, putting the cover out of the way when not in use.

The graduated circles supplied for use with the navigational range-finder are usually not in adjustment with the ship's head. They can be made adjustable. Accurate long distance bearings are then possible, but the range-finder must always go end for end in

its mount the way it was when adjustment was made. Division of these circles into 180 degree sectors is a nuisance, but they are so seldom used for bearings that remarking is hardly worth while.

AZIMUTH CIRCLES

Now that the wing repeater has replaced the pelorus and alidade, the officer of the deck demands an azimuth circle for taking bearings in formation. Some do and many do not take care of the circle. Result—one poor circle. If there are but two circles on board, better label the other one "Hands Off" so as to be sure a good one is always available. If adjustment of a sun mirror is attempted, remember it should be moved to throw the beam opposite the way it is desired the correction should go. In other words, if the adjustment is to decrease the azimuth reading, the reflected beam should go to the right. A most satisfactory way of stowing an azimuth circle, is to hang it from a hook on the chart-house bulkhead. The hook should be made from a strip of flat metal about 5/8 of an inch wide, and covered with cloth. The circle is then quickly available, out of harm's reach and its storage box does not have to be around in the way.

The circle on the bridge (by desire of the officer of the deck) can have the sun mirror protected by a neat brass cover made to slip on over the mount of the glass. The mirror must then be kept standing upright to prevent moisture from running down into the cover.

CHART BOARDS

The bridge chart board should be large and roomy with a good light so arranged as to shade the eyes. There is nothing so disagreeable as a cramped chart board when rapid work is necessary. The standard board as issued is practically useless and home-made boards seem the order of the day. The board itself must be kept a flat surface or all sorts of slips of parallel rulers (and tongue) result. A good quartermaster, broken glass, sand paper and clear shellac work wonders. As a general thing, 24-inch parallel rulers give the best satisfaction on a large board, because one does not have to plan so carefully just how to lay the rulers for the desired result.

When a chart has to be used in oil skin weather, the necessity of a back curtain for the chart board immediately becomes ap-

parent. A good scheme for protecting the chart in such weather is to place several large strips of blotting paper across the lower edge of the chart. Do not forget most of the drip comes from the sou'wester, so take it off before leaning over the chart.

A shelf for parallel rulers, paper weights and note book helps a lot. Pencils and dividers can be conveniently stowed in leather loops at some suitable part of the chart board hood.

Lead strips about 15 inches long, 1½ inches wide and a quarter of an inch thick, covered with flax canvas, make fine chart weights for use in breezy weather. The lead strips can easily be cast on board. Their use prevents the wind from getting a grip under the edge of the chart. The canvas should not be shellacked or painted. Scrub when necessary.

INSTRUMENTS

Clean the graduated silver arcs of instruments with a non-abrasive mixture, otherwise bad scratches are sure to result. After cleaning, some scrapings from a soft lead pencil rubbed into the graduations will bring them out in sharp definition.

Set the sextant arm to the position which permits the sextant being stowed properly in its box. Then scratch a mark on the brass part of the arc. Thereafter setting the arm to this mark insures the lid of the box being properly closed at the first attempt.

Clear shellac over backs of mirrors protects the silvering from destructive dampness. To be efficacious the shellac must slightly overlap all edges of the silvering. Never try to force a mirror into an instrument. If too tight a fit, work one edge down slightly with emery cloth.

Keep points of dividers sharp. A pencil sharpener is almost a necessity. If one cannot be obtained on board, spend a dollar ashore for one. It will be found a dollar well invested.

Because we move in a day of standardized propellers, do not neglect the patent log. Have the error of a couple of rotators well established in good weather by comparison with the revolution curve when the ship's bottom is clean. The log may come in very handy some time when bucking a head sea and wind. At such times one is glad to know what the ship is actually making through the water.

If fortunate enough to have a drafting machine, install an anchor for it in the chart house as well as one in the chart board. Its

use will be found to be a great time saver in plotting lines of position and in working up the dead reckoning of a "battle." The two arms being at right angles, one can be used for laying off the intercept and without further setting the other arm is ready to be used for drawing the position line. Scribe index marks every 90 degrees from the one which comes on the instrument. These new marks are handy for using the right angle arm and for picking off reverse courses and bearings.

CHARTS

Use a soft lead pencil on charts. Drawing pencils make nice, neat work, but are very hard on the chart. For erasing pencil marks and cleaning charts, obtain a supply of artist's cleansing erasers. One known as art gum is now on the supply table. Use plotting sheets for all off shore work and put as few marks as possible on charts.

Charts should be folded as few times as the size of the drawers admit. Frequently it will be found an inch or so trimmed from one or two borders will allow an unnecessary fold to be dispensed with. If possible to avoid doing so, never fold a chart through a compass rose. Put legend of chart on edge of fold which will be uppermost and to the front when chart is in the drawer. Put consecutive number in red lead pencil at the right of legend and chart number in blue pencil at rear of right edge. The latter number is then hidden until chart is actually removed from the drawer, and one can never confuse it with the consecutive number.

Establish some standard scheme for folding charts such as for a single folded chart, turning the first fold with legend on it towards one leaves chart in position to use. For a double folded chart, turning first fold to the left and second fold towards one leaves chart in position to use.

When not furnished with a drafting machine, a good way to prepare an anchorage chart which will be used a number of times, such for instance as that of Newport, is to lay off a compass rose about 12 inches in diameter with some prominent object as a center. At Newport use Rose Island Light as the center. Should the object at the center be used for a bearing in getting on a line to the anchorage berth, it is only necessary to lay the rulers through the object and the proper graduation of the rose. Bearings of other objects can be quickly and accurately picked off and run up.

IN THE CHART HOUSE

Fit removable slats at the fronts of chart drawers across their tops. The slats should have ends fitting in mortises at the sides of wooden drawers and in clips secured to sides of metal drawers. They serve to hold the charts down while drawers are being closed and opened.

A small book shelf on the forward bulkhead over the chart desk is a great convenience. It serves to hold books in constant use, forms, etc. There should also be a shelf fitted to hold parallel rulers, with a groove along the front for pencils and dividers. Remember the chart is not the place to lay things. If possible, get a supply of pencils different in color from the others used in the ship. Swap with some other ship if necessary. Pare down a portion of one side and mark "Navigator" on the bare wood with ink. The navigator may be able to keep a pencil so prepared, but usually it goes like all the others. Shun round pencils. They never stay where they are placed.

Printed forms are an old story and every navigator has his own which are better than all others. They are a great convenience and time saver. Marq St. Hilaire and a combination meridian altitude and reduction to the meridian forms are all the writer finds necessary. Once in a while a Polaris form comes in handy, but is really not very necessary. There are two Marq St. Hilaire forms, one for the sun and one for stars. The latter has a good feature in that sights of three stars can be worked on the same form—we all know we should take three stars and not be satisfied with two. As a matter of fact a fourth sight is fine to have to fall back on in case one of the other three works out suspiciously. Altitudes sometimes are read incorrectly due to hurry and poor light; this causes all sorts of trouble.

The Nautical Almanac is so convenient that it is remarkable how frequently the wrong day, or sometimes month can be used. One scheme is to always cross out with lead pencil, all previous days. Do the same with the columns of the star table. Also mark across the faces of Right Ascension of the sun pages to the effect it is not Sidereal Time. These may seem like foolish precautions, but frequently brains are not running full speed for morning stars and it is an awful shock to find some little foolish error has ruined the whole work. In the fleet these days, the navigators have but

little time to spend on navigation, and in the hurry of the moment all sorts of weird mistakes are liable to creep in. Best to be on the safe side.

MISCELLANEOUS

To do away with the cumbersome storage battery when using the navigational range-finder at night, cut in on the 22-volt lighting circuit of the wing repeaters and install connections for the range-finder lights. The two 10-volt lamps can be connected in series. It is best to use telephone jack boxes, then no one will attempt to plug in a portable. The jack is more convenient anyhow.

A sliding tray is useful in the drawer where lead pencils, dividers and such articles are kept. The tray practically doubles the capacity of the drawer.

A table made up to give the distances steamed, by increments of one minute from one to sixty over whatever range of speed in knots desired, will be found most convenient.

Every once in a while some one gets hold of the wrong lever and the siren goes in place of the whistle. Have levers cast with a big *W* on one and a big *S* on the other. Makes an almost fool-proof arrangement.

To avoid the use of thumb tacks in holding a mooring diagram on its board, drill pairs of 1/16-inch holes in the board every four or five inches so as to come inside the edges of the diagram. Thread a piece of strong linen and reeve it through the holes and the paper. Thumb tacks are always in the way of the parallel rulers. Another way is to have the board slightly smaller than the diagram. Fold the latter's edges over and place the tacks in the edges of the board. If the diagram is pasted on the board, the dampening will distort it.

An inner compass rose cut from a worn out diagram and pivoted with a pin at the center of the diagram in use, can be revolved so the printed lines of the diagram can always be used for short range target practice approaches regardless of the base course set. When properly oriented, secure firmly with a couple of thumb tacks on the side away from the line in use. A rose arranged in this manner on one of the old style diagrams, makes it as convenient to use as is the newer type.

Paste a strip of chart paper on a light wooden batten and pivot the latter at the center of the diagram. The hole for the pivot must of course be in line with the working edge of the batten.

Graduate the strip in pencil as desired. This arrangement gives a board which can be used for all sorts of approaches without recourse to special boards.

In these days of morning, noon and night general quarters, how many of us have not hastily entered the conning tower in flying spray weather and found bucklers securely fastened in some or all of the peep holes? Probably the captain comes in before the bucklers can be taken out and has a few disagreeable words to say. A means to do away with the bucklers in all except the heaviest weather, is to use a canvas strip about 12 inches wide as a cover for the peep holes. A lashing on each end permits the strip to be drawn snugly against the conning tower over the holes. It is only a moment's work to get the canvas clear.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

BACK TO FIRST PRINCIPLES

By Lieut. Commander F. L. Oliver, U. S. Navy

A recent cruise of the Atlantic fleet during heavy weather in the vicinity of Cape Cod developed some interesting data in regard to the effect of a strong head wind and heavy sea on the speed of large ships.

On the night of December 15, 1916, at 11.00 p. m., soundings showed the fleet to have just passed over the 50 fathom curve in Lat. 41° 10′ N., Long. 69° 09′ W. by dead reckoning; course 5°, standard speed 10 knots.

At 12.45 a. m., December 16, course was changed to 315° true. The wind at midnight was from south, force 3. All evening the barometer had been falling rapidly. Between midnight and 1.00 a. m. the wind hauled to W. × N. and freshened to 7. Before 2.00 a. m. it was blowing 11 and continued at this force until afternoon when it moderated slightly. The weather was thick. Standard speed remained 10 knots until 2.00 a. m. when it was changed to 8 knots and again at 7.40 a. m. to 7 knots. The latter speed was held until afternoon. At 8.00 a. m. the course was changed to 0°.

Considerable speculation was indulged in as to what speed through the water was actually being made. To satisfy himself, the writer resorted to the time honored but little used chip log, which gave the speed as 4.2 knots while turns for 7 knots were being made. It seemed almost impossible that the ship was being held back nearly 3 knots an hour by wind and sea, but subsequent events prove the chip log to have given reliable information.

All forenoon a sight of the sun was eagerly sought. Occasional bright patches in the clouds aroused hopes which were eventually realized a few minutes after local apparent noon, when the sun showed itself for a few seconds. The sight obtained gave the

noon position at Lat. 42° 05′ N. by observation and Long. 69° 40′ W. by dead reckoning. At 12.45 p. m. bottom was obtained at 75 fathoms checking the noon position very nicely.

Dead reckoning from the 11.00 p. m. position of the preceding night, using the chip log data, with appropriate current correction, and allowing a leeway of 10°, gave the noon D. R. position as Lat. 42° 07′ N., Long. 69° 40′ W.

Once before the writer had a somewhat similar experience with a head wind and sea. The speed was then over estimated and the ship lost her reckoning. At that time the chip log idea was unfortunately an afterthought. The idea stuck though and is considered to have proved its value.

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A TELESCOPIC AZIMUTH CIRCLE

By Lieut. Commander F. L. Oliver, U. S. Navy

The Mark III azimuth circle having been designed for use with the 7½-inch magnetic compass, does not give entire satisfaction in taking terrestrial bearings with the Sperry gyro repeater.

In the repeater, the card is considerably closer to the bezel than is the case with the magnetic compass. Consequently the prism for reflecting card graduations gives a limited view which makes difficult taking quick observations, even in day time. At night the graduations are even harder to read, especially when the repeater light has become dim, or when the prism is exposed to damp weather.

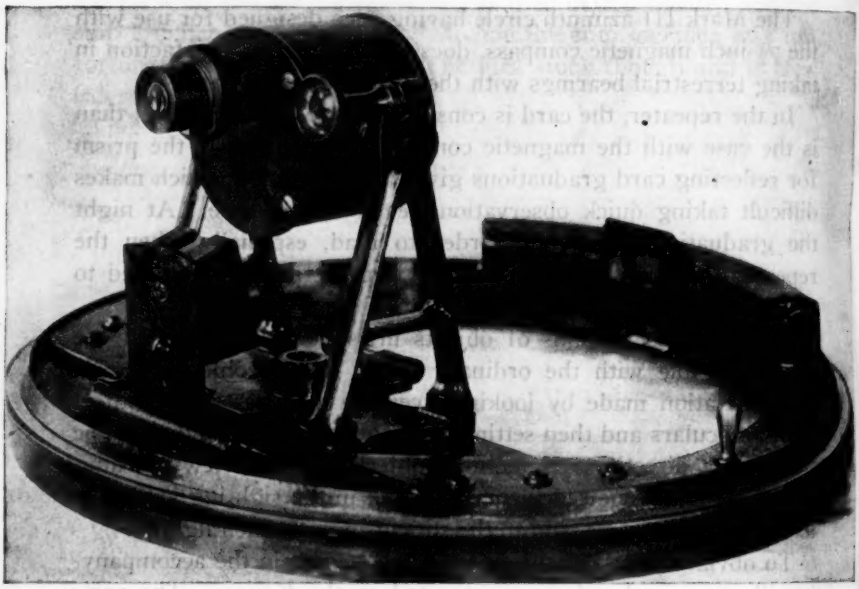
Accurate observations of objects invisible to the unaided eye are impossible with the ordinary circle, and become simply an approximation made by looking over the compass at the object with binoculars and then setting the vanes to what is judged to be the correct direction. Sometimes objects in plain view are difficult to see when viewed through the slit in the sighting vane, due to using only one eye, and to the slit cutting off much light.

To obviate these difficulties the circle shown in the accompanying illustrations has been constructed on the *Kansas*. The parts used were the so-called Short Pelorus Telescope and an old azimuth circle kindly furnished by the Naval Observatory. The telescope is one of some 50 or more issued ships several years ago for use with the old illuminated dial pelorus. These telescopes did not meet with general favor with navigators because they were inconvenient to use. The center of the supporting stand was pivoted at the center of the pelorus card, drawing the eyepiece into a position which made it physically uncomfortable for an observer to use the instrument.

The telescope is a well-constructed prismatic glass of about 3½ diameters and gives a clearly defined image over a field of 8½°. There is an adjustable focus and the usual cross wires.

The illustrations give a good idea of the design of the assembled instrument. As the eyepiece is brought near the edge of the repeater, the disagreeable feature due to being pivoted at the center no longer exists. A lead weight counterbalances the telescope, being off center. The clamp permits movement of the telescope in the vertical plane.

The circle used in the construction was a truly remarkable affair with numerous prisms, colored sun-glasses, etc. It is a



Telescopic Azimuth Circle

concentric circle, *i. e.*, the inner part turns within the part fitting the bezel of the compass. The outer part carries a scale graduated from zero to 360°, showing someone was far ahead of his day as the patent date is 1877. The inner part carries a vernier having a least count of one minute. The scale and vernier do not enter into the use of the instrument and are described because they appear in the illustration.

Two of the prisms were used in making the new circle. A 45° prism which may be called the object prism, is located opposite the telescope and reflects the graduations and the index mark to a second 45° prism. The latter may be called the eye prism and is

located under the rear of the telescope. The two prisms give an erect image.

The object prism is quite large and covers a field of 10°. It has a curved bottom to prevent distortion of the reflected graduations. The index mark came with the circle and is a thin black line on a small white enameled strip. To permit use at night a small V was filed at the end of the mark. This V is sharply outlined by the repeater light and gives an excellent reference mark. The arrangement of the prisms is such (see sketch) that by dropping the eye from the telescope without moving the head, the observer sees the bearing clearly defined in the eye prism. For accuracy in taking bearings of distant objects the level should be used. It

ARRANGEMENT OF PRISMS FOR READING OFF BEARINGS

is so situated that the bubble can be easily seen. It is found that an easy way to see the cross wires at night is to hold the hand in such position that a small amount of light from the repeater is reflected from the hand into the object glass of the telescope.

An ideal circle would be of such design that the bearing could be read within the telescope. The one described, however, meets with all ordinary requirements and is most favorably commented on by all who have used it. The facility with which bearings of distant objects, and the rapidity, ease and accuracy with which bearings of near-by objects can be taken, are such that this description is given in hope others may be able to construct similar ones for their use.

NOTE.—Telescopic azimuth circles based on the above design have been constructed for use in the U. S. Naval Service.—ED.

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POSITION LINES AND CURRENT

By LIEUT. COMMANDER H. G. SPARROW, U. S. Navy

About two years ago I read with much interest and profit Lieut. Commander Hepburn's article "Some Suggestions in Practical Navigation" which appeared in the NAVAL INSTITUTE PROCEEDINGS. His wide experience in the practice of navigation well qualifies him for the discussion of that subject and his article was very timely.

The bulk of the article, as readers will remember, dealt with the use of single position lines in order to determine the true position of the ship.

I had never laid down for my own guidance any particular rule, or set of rules, as to the method of making allowance for current in the crossing of position lines but was always guided by expediency, making such allowance in each case as the known conditions seemed to warrant.

Lieut. Commander Hepburn's article suggested a definite way of using lines, which might be relied upon in all cases to give dependable results.

From the diagrams and description accompanying the article it was not difficult to see that, where the current remained steady in set and drift, his method gave exact results. From the illustrations of the use of the method quoted it seemed, too, that it gave excellent results in cases of unsteady current.

I resolved to assume a number of different conditions, plot the hourly position of ship, and, applying Hepburn's method, see how accurate were the results.

The diagrams so plotted, numbered from I to IXa, are reproduced in the plates accompanying this article.

In each case the ship is assumed to steam on a steady course which is not the same in all the diagrams; the exact course is immaterial to the discussion, so is not stated. The ship's speed

through the water is assumed to be ten knots and the D. R. position each hour is indicated by plain Arabic figures. In the diagrams one-quarter inch equals one mile.

The locality is taken as in 40° N. latitude, the date May 16, and the body observed the sun. The inclination of the position lines varies from hour to hour exactly as the sun's change in azimuth at the place and time given, beginning in some diagrams at 7 a. m., in others at 8 a. m. The absolute bearing of any line is not important and therefore not stated.

The long, thin, horizontal black line represents ship's D. R. track; the broken black line at each D. R. hourly position shows the set of the current during the hour, except in diagrams IX and IXa, in which the set of current is the same as in diagram VIII.

The small black circles indicate true position of ship at end of each hour. The assumed current conditions are stated under the diagram number.

The short dotted lines crossing ship's D. R. course are the advanced positions of the first position line (except in diagrams VIa and IXa, to be explained later); the prime figures indicate intersection of these dotted lines with ship's D. R. course and mark equal divisions along the course from the beginning, or last "fix"; dotted circles mark the intersection of the advanced line with each succeeding line. It will be remembered that the method recommended was to advance the first position line each hour along the course a distance equal to the intercept on D. R. course between last fix and first position line. It is understood, of course, that all lines are obtained at hourly intervals, the first one being one hour after last "fix."

Let us begin with the case of steady current, diagram I. Here the true positions coincide with those obtained by advancing the first line by amounts equal to the intercept on D. R. course between fix O and where first position line cuts same course. Inspection of the diagram shows that this must be so, as we are dealing with a series of similar triangles. Therefore, when current is steady in set and drift, this method of crossing lines will always give us our true position.

Is the converse true? That is, if we obtain a series of positions lying in a straight line which, produced backwards, passes through the origin of the D. R. course, are such positions correct and is the current steady? Alas, no.

A little measurement will show that if, in diagram I, we have a current directly against us the first hour of two and one-quarter knots, the second hour one and one-quarter knots, third hour three-quarters knot, fourth hour one-half knot, fifth hour zero and sixth hour a current directly with us of one and one-eighth knots, our diagram will remain unchanged, except that the true hourly positions will all be on the D. R. course line.

Again, a little thought will show that we may have a current revolving in set and unsteady in drift which will give us the same position lines and give true positions all above the D. R. course line.

So we see that, though there is a presumption that a series of intersections that plot in a straight line which, produced backwards, passes through the origin, are true positions, yet we have no guaranty that such is the case.

Next we take the case, diagram II, where our current increases from one knot to four knots in as many hours. This is not an improbable case, as such conditions exist in the Florida Straits and elsewhere.

Here we get rather disquieting results. Our positions by intersection would indicate that we are being set to the left of our course, whereas the opposite is true and the plotted positions and true positions separate until, at the end of five hours, they are *eight and one-quarter miles apart.* Here the position line parallel to the D. R. course shows the great advantage of such a line, when we can get it. We always think of the set of current in terms of two rectangular coordinates with respect to our course. Are we being set ahead or back and to the right or left? A line perpendicular to the course alone answers the first question and a line parallel to the course the second.

Leaving for later consideration the additional dotted lines on diagram II, we pass on.

Diagram III shows a current of the same drift as diagram II but setting to the left instead of right of D. R. course. Our intersection of lines again gives false results, though this time they indicate truly the side to which we are being set. The final discrepancy in position after five hours is nine and one-quarter miles.

No comment is made for the present on the additional dotted lines of the diagram.

Diagram IV differs from diagram III only in that the current is decreasing instead of increasing. The results are quite plain and comment on diagram II applies to this case.

In diagram V we first take up a current which varies in drift from a minimum to maximum and back to minimum. The strength chosen is less than in preceding cases and represents conditions likely to be met with almost anywhere. Then results of plotting need no explanation, but they emphasize the fact brought out above—that we may get very erroneous indications.

Diagram VI differs from diagram V only in set of current. No further comment is considered necessary on it.

Diagram VIa reproduces all the conditions of diagram VI, except that the position lines are plotted at different angles relative to the D. R. course. Here our first position line cuts the D. R. course at an extremely acute angle, so we wait until we have three lines plotted, then move second line forward, moving it one-half the distance from o to 2′, assuming current steady the first two hours.

Diagram VII is new only in that the set of current is at right angles to the D. R. course. We note that, in this case, our intersections give us very close approximations to the true positions.

In diagram VIII is first introduced variable set of current. Here the current sweeps around clock-wise, changing its set thirty degrees each hour. The drift is steady.

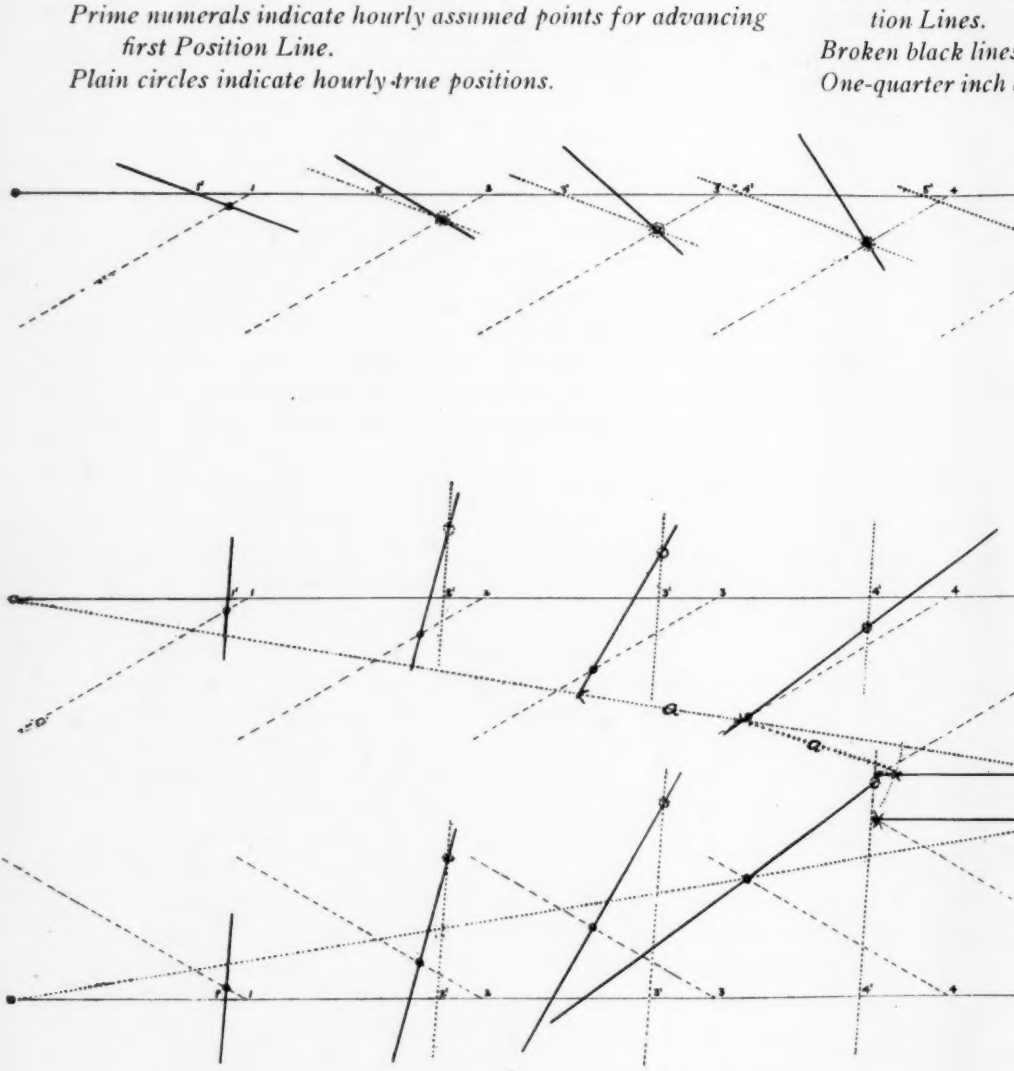
In this diagram our intersections give worse results than in any preceding case. For the seventh, eighth and ninth hours the lines intersect so far off the D. R. course that the intersection cannot be shown, but its position is indicated by arrows on position lines. Note that after nine hours the true position plots on the D. R. course though we should never suspect it from our intersections.

Diagram IX is drawn with current setting the same as in diagram VIII, but of variable strength. This is a condition such as is met with on Nantucket Shoals. Here the first position line passes through the D. R. position. The positions by intersection are not such as to give us confidence in sights when crossing the shoals.

Diagram IXa is a repetition of diagram IX, except for relative bearing of position lines to D. R. course. The same comment as to carrying forward the second line instead of the first applies here as in diagram VIa. The plotted positions agree pretty well with

Plain numerals indicate hourly D. R. positions.
Prime numerals indicate hourly assumed points for advancing first Position Line.
Plain circles indicate hourly true positions.

Dotted circles ind
tion Lines.
Broken black lines
One-quarter inch



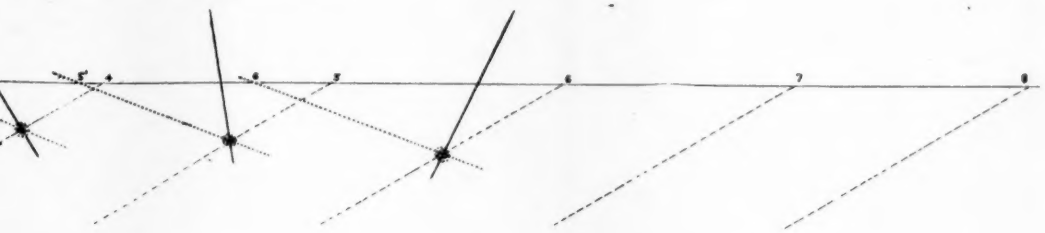
otted circles indicate positions obtained by intersection of Position Lines.

roken black lines indicate set of current.

ne-quarter inch equals one mile.

I

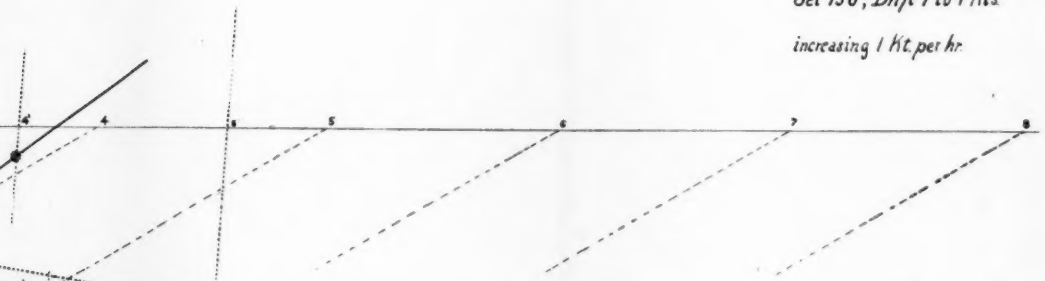
Set 150°; Drift 1 Kn.



II.

Set 150°; Drift 1 to 4 Kts.

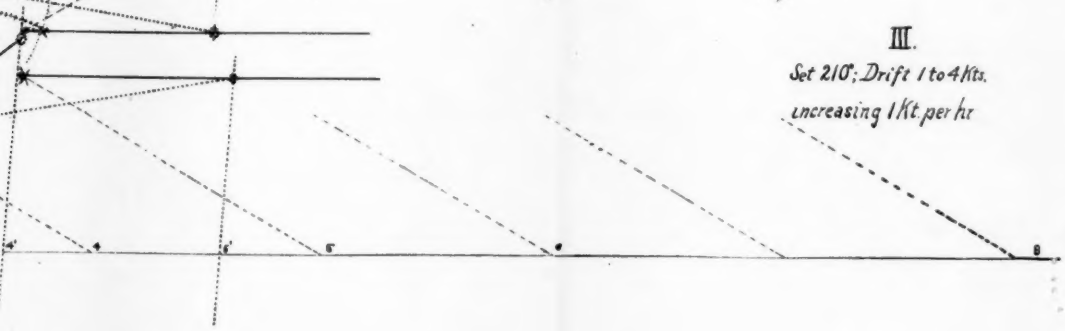
increasing 1 Kt. per hr.

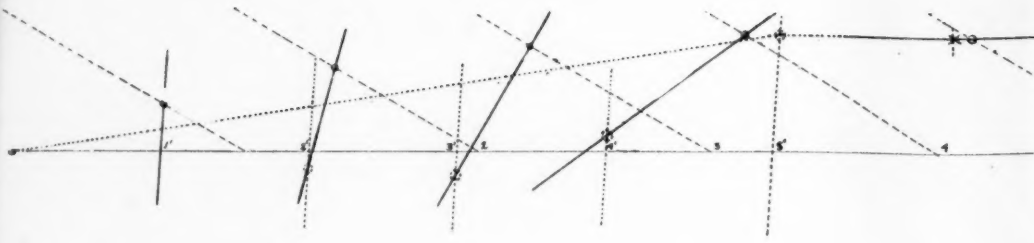


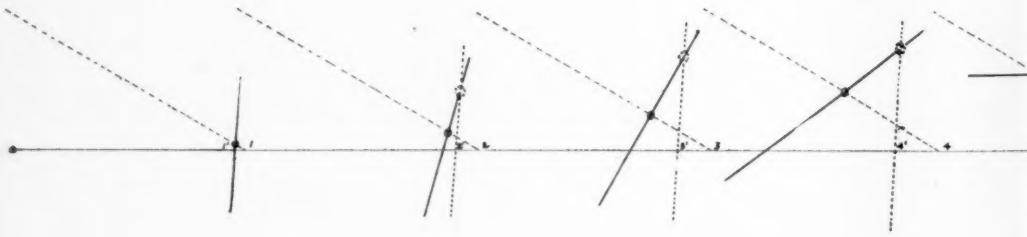
III.

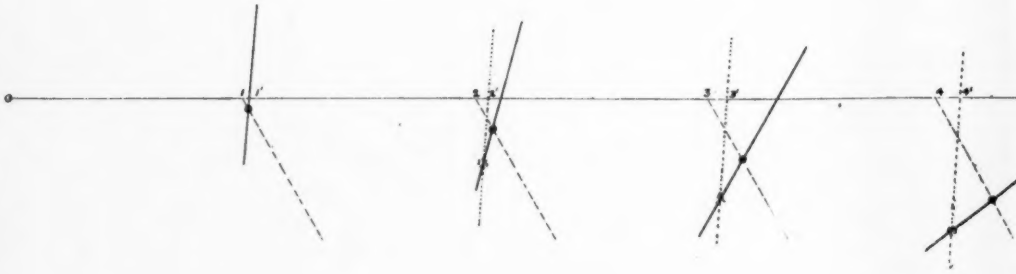
Set 210°; Drift 1 to 4 Kts.

increasing 1 Kt. per hr.



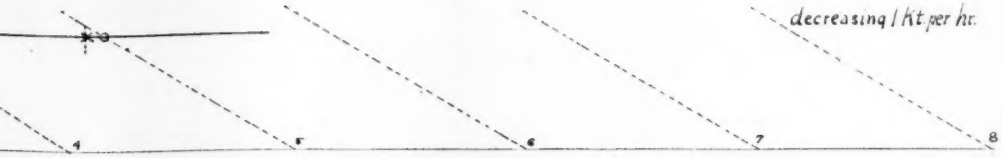






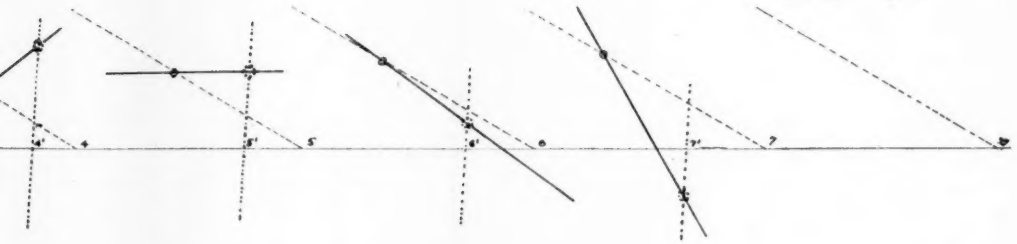
IV.

Set 210°; Drift 4 to 1 Kts
decreasing 1 Kt. per hr.



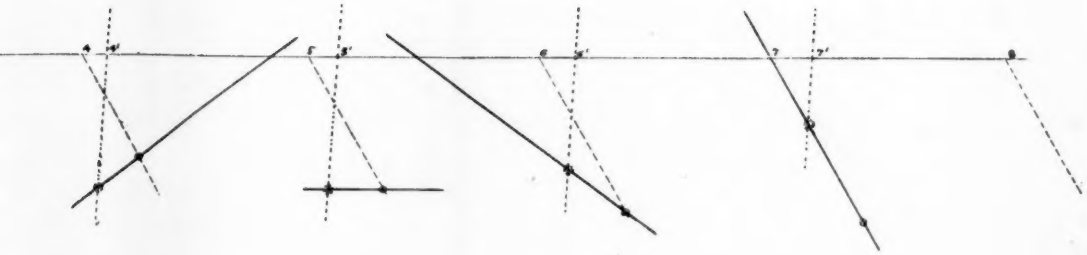
V.

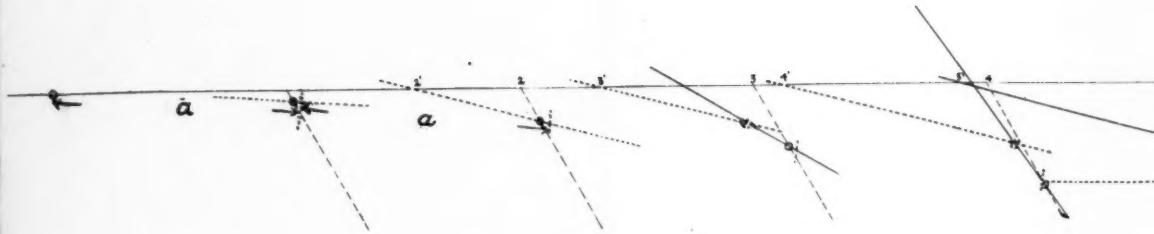
Set 210°; Drift ½ to 2 to ½ Kts
varying ½ Kt. per hr.



VI.

Set 60°; Drift ½ to 2 to ½ Kts
varying ½ Kt. per hr.

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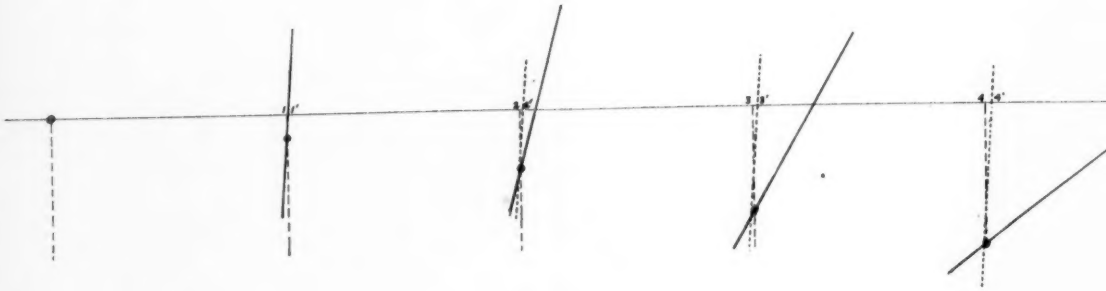
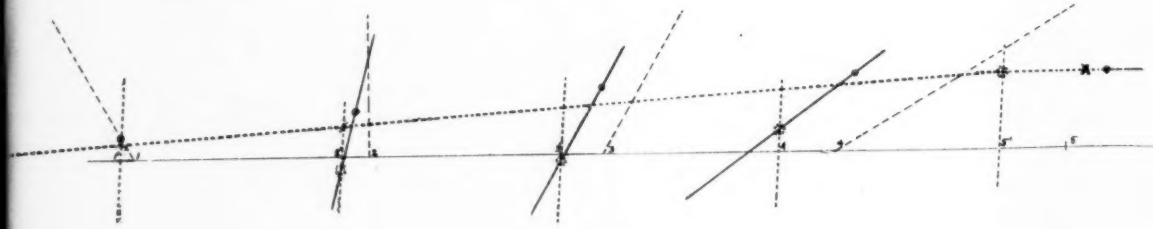




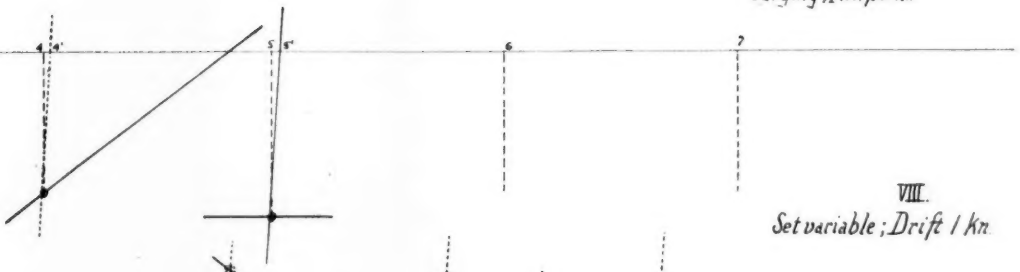
VI a

Current same as in VI.

VII.

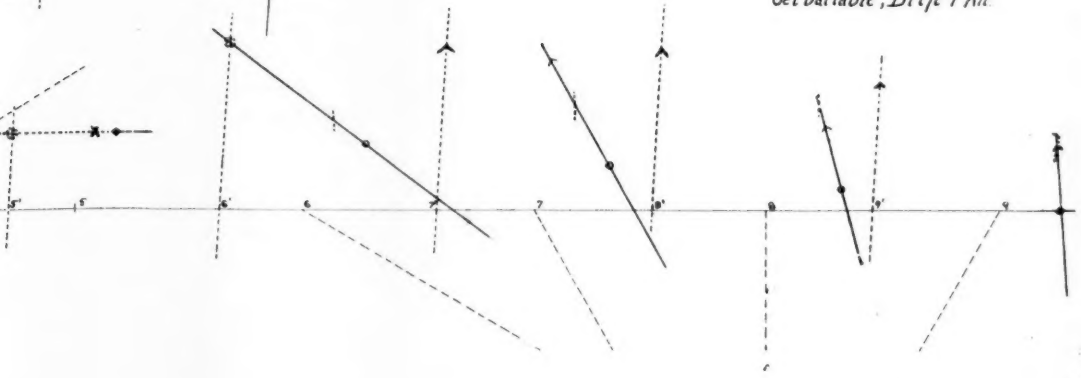
Set 90°; Drift 1 to 2 to 1 Kts.

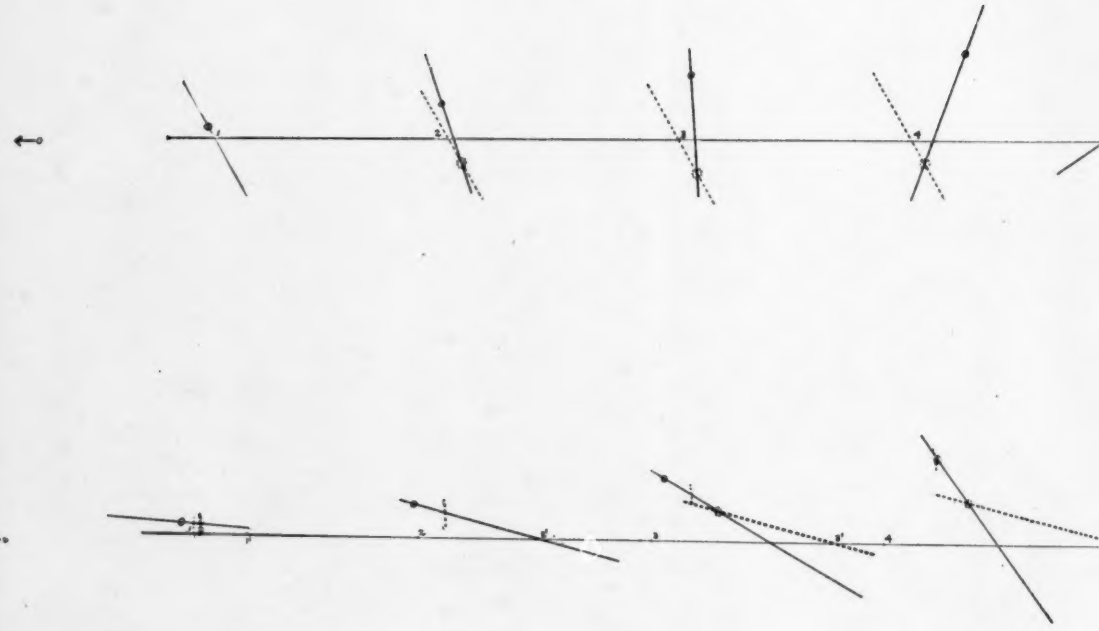
varying ½ Kt. per hr.



VIII.

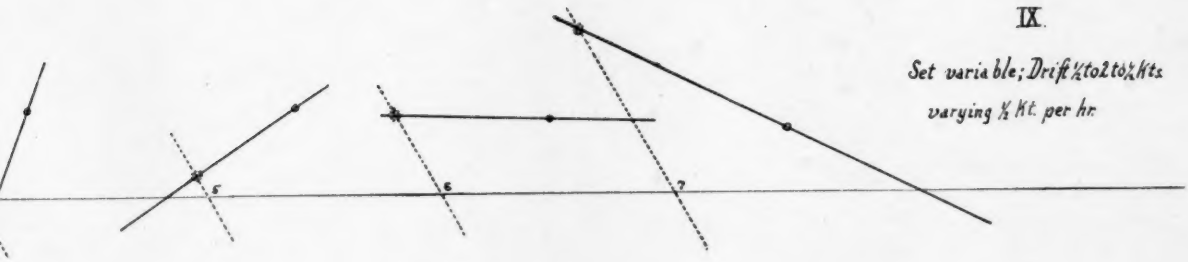
Set variable; Drift 1 Kn.





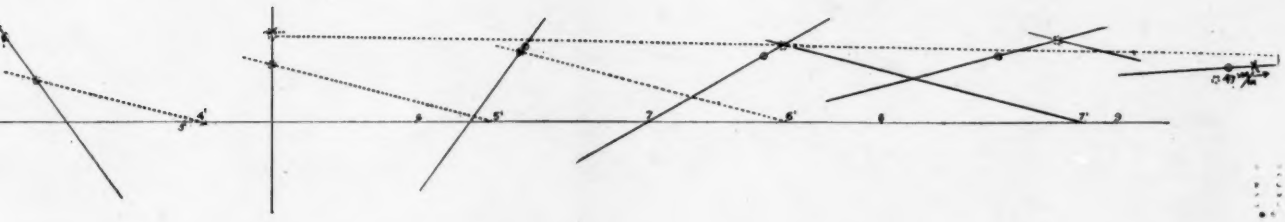
IX.

Set variable; Drift ½ to 2 to 2½ kts
varying ½ kt. per hr.



IX a

Current same as in IX



true positions until we get to the ninth hour when they differ by seven and three-eighths miles. (The plotted position is off the diagram but is indicated by arrow and distance, 47 mm.)

Another diagram was plotted in the rough, but not copied, wherein the plotted intersections were all on the D. R. course and close to D. R. positions, although the true positions ran all around. Such a case would give the navigator a firm but false conviction that the current was negligible.

After making these diagrams and poring over them many times and long, realizing the helplessness of the navigator, I felt with Kipling

> " An' the end of it's sittin' and thinkin',
> An' dreamin' Hell-fires to see."

Various tricks were tried with the lines and, on several diagrams, I could get a scheme which gave fine results for that particular diagram, but worthless results on the others. Unfortunately the navigator at sea does not know (with any certainty) which of the cases confronts him, therefore he must have a method which applies equally well to all cases, or he is no better off than before.

While not laying claim to having found such a method, I did hit on a scheme which, if applied to any of the diagrams, will give fairly good results.

Applying the rules which are given below to the diagrams, the greatest error obtained (diagram VIII) was two and one-half miles. Most of the cases give results not over a mile in error.

A serious shortcoming of the method is that it can be used only if a position line within five degrees of any one of four bearings can be obtained; that is, forty degrees of bearing out of the whole circle alone are available.

In order to use the method we must, after obtaining three or more position lines, obtain one which is within five degrees of being parallel to our D. R. course or perpendicular thereto.

The rules for the proposed method are but two in number and are alternative in character, that is, in some cases one rule is used, whereas in other cases the second rule applies.

The rules are given below, followed by an example of the application of each one. The examples are worked out graphically in the diagrams on the accompanying plates, so that it is hoped that what clearness is lacking in the statement of the rules will be compensated for by the simplicity of the examples and diagrams.

A few preliminary words and definitions are needed to avoid cumbersome circumlocutions in the statement of rules.

In all cases it is necessary first to have plotted three or more position lines, the last of which is parallel (or within five degrees thereof) to the D. R. course, or perpendicular (within the same limit) to that course. For the present we shall assume that the lines are all obtained at exact hourly intervals, the first one being one hour after the latest "fix."

The position line parallel to D. R. course or perpendicular to it I shall call the *determining* position line, as it is the one on which we determine our true position or fix. In any particular case we deal with either a parallel *or* a perpendicular *determining* line, but not with both, so no confusion can arise on this score.

All position lines plotted prior to the determining line will (probably) be oblique to the D. R. course, so I shall call them *oblique* lines, calling the one which immediately precedes the determining line the *last oblique line*. Others will be called *first oblique line, second oblique line,* etc., beginning with the first one obtained after latest "fix," will be spoken of as the *origin.*

The first oblique position line is, in all cases, to be advanced hourly by an amount equal to the intercept from the origin on the D. R. course. This follows Hepburn's rule. The intersections of the advanced first oblique line with its successors give us positions which we shall call *assumed* positions. Having no better information at hand we assume these intersections to be our true positions until we have further data.

With these preliminaries and with a reiteration of the statement that the procedure when the *determining* line is parallel to D. R. course is governed by one rule, and that the procedure in a case where the *determining* line is perpendicular to D. R. course is governed by the other rule, the rules themselves follow.

RULE I.—*When the last of three or more position lines is parallel to D. R. course.*

Having obtained our *assumed* position on the *determining* line, join that position to the *origin* by a straight line. On this straight line measure the distance intercepted between the *last oblique* line and the *oblique* line just preceding it. Call this distance "a." With "a" as radius and with center at intersection of straight line and *last oblique* line, strike an arc cutting *determining* line. Where this arc cuts *determining* line is our true position.

Example.—See diagram II. Here the line at fifth hour is our *determining* line. Line 5′ intersects it in our *assumed* position. The straight line from *origin* to *assumed* position is shown dotted. The intercept on the dotted line between the third hour line and the fourth hour line is "a." The cross on fifth hour line is taken as true position.

In diagram II this comes within a mile of true position. In diagram III the error is one-quarter mile. The method is also shown in diagram IV, in first part of diagram VIII and in last part of diagram IXa.

RULE II.—*When the last of three or more position lines is perpendicular to D. R. course.*

Obtain *assumed* position on *determining* line. Measure the distance in a straight line from *origin* to this *assumed* position. Divide this distance by the total number of position lines plotted. Call the quotient "a." With "a" as radius and with center at *origin*, strike an arc cutting *first oblique* line. With this intersection as center and with same radius "a," strike an arc intersecting *second oblique* line. Continue this process until you strike an arc across *determining* line. This gives true position, *provided* the distance "a" is long enough to reach from *last oblique line* to *determining* line. It is usually too short to do this; in such cases, draw a straight line from intersection of arc with *last oblique* line perpendicular to *determining* line. Where this perpendicular strikes *determining* line is taken as true position.

Example.—See diagram VIa. Here the entire method is shown except that the straight line joining *origin* and *assumed* position on *determining* line is not shown as it might make the diagram confusing.

The application of this rule is also shown in last part of diagram VIII and in first part of diagram IXa.

In all the diagrams the position lines are shown taken at equal and hourly intervals. It need hardly be said that equal intervals of other length may be used or unequal intervals may be used (if not too greatly unequal), care being taken to use proper proportions in plotting, carrying forward lines, striking arcs, etc.

It is to be regretted that a rule of more universal application cannot be proposed, but there is no doubt that, if sufficient interest is aroused in the effort, some one else will succeed where I have

failed. Meanwhile it would be well if attention were given to the problem of obtaining instruments which will permit us to observe two celestial bodies at any hour, day or night, in clear weather.

BEARINGS AND DISTANCES

Among the other instructive points brought out by Lieut. Commander Hepburn is the neat rule about laying a course to pass a distant object at a given distance. This is what he refers to as the "one-fifth rule."

This is a very handy tool. It has a mate which I give, not that it is better, but simply because of a prejudice against anything which perpetuates the old "points" of the compass.

Remembering that a radian is fifty-seven and three-tenths degrees and that we make an error of less than five per cent by calling it sixty degrees, we have the rule that one-sixtieth of the distance from a ship to a distant object is the distance at which the ship will pass that object for each degree that it bears on the bow, provided we hold a steady course and there is no current set athwart the course. This rule may be used from zero degrees to thirty-five degrees with less than five per cent error.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

FINDING THE AZIMUTH FOR DETERMINING THE SUMNER LINE

By G. W. LITTLEHALES

Attending the practice of the principle, known as the Method of Calculated Altitudes or the Saint Hilaire Method, of determining the Sumner line by finding how far away it is from an assumed geographical position and in what direction, there is the signal merit of bringing nearly the whole of nautical astronomy within a single rule of procedure. In the latest issue of the *American Practical Navigator,* this feature is noticed; and, of the simple formulas therein supplied for calculating the zenith-distance, and hence the altitude, that any celestial body would have to an observer situated in an assumed geographical position, the most widely received is, perhaps, the cosine-haversine formula,

$$\text{hav } z = \text{hav } (L \sim d) + \cos L \cos d \text{ hav } t,$$

which is applicable in all the relative situations of the observer and the observed celestial body, by the same course of computation in every case.

If the observer should happen to be in the assumed geographical position, the altitude that he would observe would be equal to the altitude resulting from the computation of the above formula; but, if his actual station is in a different place from the assumed geographical position, the difference between the altitude that he would observe and the calculated altitude, usually referred to as the altitude-difference, would indicate the shortest distance from the assumed position to the circle of position or Sumner line upon which his station is located.

To find the direction in which the altitude-difference is to be laid off, which is the azimuth or true bearing of the observed celestial body to an observer situated in the assumed geographical position, it has been customary to resort to the existing azimuth tables or else to compute the azimuth either by the time-azimuth

formula or the altitude-azimuth formula; but it is now purposed to apply a different method, by which special tables that have been arranged in a form reduced to small extent will render quick service in finding the azimuth. When the cosine-haversine formula has been solved, the parts of the astronomical triangle that become known are, besides the co-latitude, the hour-angle and its opposite side of zenith-distance and the polar-distance, whose opposite angle is the azimuth. The calculation of the required azimuth might, therefore, be conveniently effected by the proportionality between the sines of the angles of a spherical triangle and the sines of their respective opposite sides, thus:

$$\sin Z : \sin p : : \sin t : \sin z,$$

or, putting $90°-d$ for the polar-distance, p, and $90°-h$ for the zenith-distance, z, the formula may be written,

$$\sin Z = \frac{\sin t \cos d}{\cos h}.$$

To afford the navigator even quicker service than he can attain by calculating the value of Z from this simple formula, a table of the values of the logarithm of the product of $\sin t \times \cos d$ has been drawn up in the form shown by the accompanying specimen, which represents as much of the table as would be shown at one opening of the book. If this table is entered with the given values of t, the hour-angle, and d, the declination, and the corresponding tabular number is taken out, the logarithmic sine of the azimuth, log. sin Z, may be found by substracting the logarithmic cosine of the calculated altitude, log. cos h, from the number thus taken from the table. But this latter operation may be obviated, because the number which represents the product of $\sin t \times \cos d$ also represents the product of $\sin Z \times \cos h$; and hence a rule for finding the azimuth may be laid down as follows:

Take out the tabulated number corresponding to the given declination and the given hour-angle, then find this number again in that declination column which has at its head a value equal to the altitude, and, in the hour-angle column, opposite to the number thus found again in the declination column, will be the required azimuth.

The manner in which the value of the azimuth found from the table is to be marked is, in most instances, known to the navigator beforehand; but, since the tabulated values of the hour-angle and

declination are confined to a single quadrant, the following precepts may be instantly applied if doubt should arise:

The azimuth is always marked east (E.) or west (W.) according as the observed body is to the eastward or westward of the meridian of the observer.

If the latitude and declination are of different name, the azimuth is marked from the pole of opposite name to the latitude.

If the latitude and declination are of the same name and the latitude is less than the declination, the azimuth is marked from the pole of the same name as the latitude. If the latitude and declination are of the same name and the latitude is greater than the declination, the azimuth is marked from the pole of the same name as the latitude when the hour-angle is greater than the hour-angle of crossing the prime vertical, and from the pole of opposite name to the latitude when the hour-angle is less than the hour-angle of crossing the prime vertical.

Under the initiative of Captain Thomas Washington, when he was hydrographer of the navy, and Lieut. Commander Gilbert P. Chase, then in charge of the branch hydrographic office at New York, there has been issued to the naval service a volume of tables especially adapted for determining the Sumner line by the procedure herein described.

Hour Angle		DECLINATION													Hour Angle	
		19°30′	20°00′	20°30′	21°00′	21°30′	22°00′	22°30′	23°00′	23°30′	24°00′	24°30′	25°00′	25°30′	26°00′	
h. m.	°	−∞	−∞	−∞	−∞	−∞	−∞	−∞	−∞	−∞	−∞	−∞	−∞	−∞	−∞	° h. m.
3 00	45	9.82384	9.82248	9.82108	9.81964	9.81817	9.81666	9.81511	9.81352	9.81189	9.81022	9.80851	9.80677	9.80498	9.80315	45 3 00
04	46	9.83128	9.82992	9.82852	9.82708	9.82561	9.82410	9.82255	9.82096	9.81933	9.81766	9.81595	9.81421	9.81242	9.81059	46 04
08	47	9.83848	9.83712	9.83572	9.83428	9.83281	9.83130	9.82975	9.82816	9.82653	9.82486	9.82315	9.82141	9.81962	9.81779	47 08
12	48	9.84542	9.84406	9.84266	9.84122	9.83975	9.83824	9.83669	9.83510	9.83347	9.83180	9.83009	9.82835	9.82656	9.82473	48 12
16	49	9.85213	9.85077	9.84937	9.84793	9.84646	9.84495	9.84340	9.84181	9.84018	9.83851	9.83680	9.83506	9.83327	9.83144	49 16
20	50	9.85860	9.85724	9.85584	9.85440	9.85293	9.85142	9.84987	9.84828	9.84665	9.84498	9.84327	9.84153	9.83974	9.83791	50 20
24	51	9.86485	9.86349	9.86209	9.86065	9.85918	9.85767	9.85612	9.85453	9.85290	9.85123	9.84952	9.84778	9.84599	9.84416	51 24
28	52	9.87088	9.86952	9.86812	9.86668	9.86521	9.86370	9.86215	9.86056	9.85893	9.85726	9.85555	9.85381	9.85202	9.85019	52 28
32	53	9.87670	9.87534	9.87394	9.87250	9.87103	9.86952	9.86797	9.86638	9.86475	9.86308	9.86137	9.85963	9.85784	9.85601	53 32
36	54	9.88231	9.88095	9.87955	9.87811	9.87664	9.87513	9.87358	9.87199	9.87036	9.86869	9.86698	9.86524	9.86345	9.86162	54 36
40	55	9.88771	9.88635	9.88495	9.88351	9.88204	9.88053	9.87898	9.87739	9.87576	9.87409	9.87238	9.87064	9.86885	9.86702	55 40
44	56	9.89292	9.89156	9.89016	9.88872	9.88725	9.88574	9.88419	9.88260	9.88097	9.87930	9.87759	9.87585	9.87406	9.87223	56 44
48	57	9.89794	9.89658	9.89518	9.89374	9.89227	9.89076	9.88921	9.88762	9.88599	9.88432	9.88261	9.88087	9.87908	9.87725	57 48
52	58	9.90277	9.90141	9.90001	9.89857	9.89710	9.89559	9.89404	9.89245	9.89082	9.88915	9.88744	9.88570	9.88391	9.88208	58 52
56	59	9.90742	9.90606	9.90466	9.90322	9.90175	9.90024	9.89869	9.89710	9.89547	9.89380	9.89209	9.89035	9.88856	9.88673	59 56
4 00	60	9.91188	9.91052	9.90912	9.90768	9.90621	9.90470	9.90315	9.90156	9.89993	9.89826	9.89655	9.89481	9.89302	9.89119	60 4 00
04	61	9.91617	9.91481	9.91341	9.91197	9.91050	9.90899	9.90744	9.90585	9.90422	9.90255	9.90084	9.89910	9.89731	9.89548	61 04
08	62	9.92028	9.91892	9.91752	9.91608	9.91461	9.91310	9.91155	9.90996	9.90833	9.90666	9.90495	9.90321	9.90142	9.89959	62 08
12	63	9.92423	9.92287	9.92147	9.92003	9.91856	9.91705	9.91550	9.91391	9.91228	9.91061	9.90890	9.90716	9.90537	9.90354	63 12
16	64	9.92801	9.92665	9.92525	9.92381	9.92234	9.92083	9.91928	9.91769	9.91606	9.91439	9.91268	9.91094	9.90915	9.90732	64 16
20	65	9.93163	9.93027	9.92887	9.92743	9.92596	9.92445	9.92290	9.92131	9.91968	9.91801	9.91630	9.91456	9.91277	9.91094	65 20
24	66	9.93508	9.93372	9.93232	9.93088	9.92941	9.92790	9.92635	9.92476	9.92313	9.92146	9.91975	9.91801	9.91622	9.91439	66 24
28	67	9.93838	9.93702	9.93562	9.93418	9.93271	9.93120	9.92965	9.92806	9.92643	9.92476	9.92305	9.92131	9.91952	9.91769	67 28
32	68	9.94152	9.94016	9.93876	9.93732	9.93585	9.93434	9.93279	9.93120	9.92957	9.92790	9.92619	9.92445	9.92266	9.92083	68 32
36	69	9.94450	9.94314	9.94174	9.94030	9.93883	9.93732	9.93577	9.93418	9.93255	9.93088	9.92917	9.92743	9.92564	9.92381	69 36
40	70	9.94734	9.94598	9.94458	9.94314	9.94167	9.94016	9.93861	9.93702	9.93539	9.93372	9.93201	9.93027	9.92848	9.92665	70 40
44	71	9.95002	9.94866	9.94726	9.94582	9.94435	9.94284	9.94129	9.93970	9.93807	9.93640	9.93469	9.93295	9.93116	9.92933	71 44
48	72	9.95256	9.95120	9.94980	9.94836	9.94689	9.94538	9.94383	9.94224	9.94061	9.93894	9.93723	9.93549	9.93370	9.93187	72 48
52	73	9.95495	9.95359	9.95219	9.95075	9.94928	9.94777	9.94622	9.94463	9.94300	9.94133	9.93962	9.93788	9.93609	9.93426	73 52
56	74	9.95719	9.95583	9.95443	9.95299	9.95152	9.95001	9.94846	9.94687	9.94524	9.94357	9.94186	9.94012	9.93833	9.93650	74 56
5 00	75	9.95929	9.95793	9.95653	9.95509	9.95362	9.95211	9.95056	9.94897	9.94734	9.94567	9.94396	9.94222	9.94043	9.93860	75 5 00
04	76	9.96125	9.95989	9.95849	9.95705	9.95558	9.95407	9.95252	9.95093	9.94930	9.94763	9.94592	9.94418	9.94239	9.94056	76 04
08	77	9.96307	9.96171	9.96031	9.95887	9.95740	9.95589	9.95434	9.95275	9.95112	9.94945	9.94774	9.94600	9.94421	9.94238	77 08
12	78	9.96475	9.96339	9.96199	9.96055	9.95908	9.95757	9.95602	9.95443	9.95280	9.95113	9.94942	9.94768	9.94589	9.94406	78 12
16	79	9.96630	9.96494	9.96354	9.96210	9.96063	9.95912	9.95757	9.95598	9.95435	9.95268	9.95097	9.94923	9.94744	9.94561	79 16
20	80	9.96770	9.96634	9.96494	9.96350	9.96203	9.96052	9.95897	9.95738	9.95575	9.95408	9.95237	9.95063	9.94884	9.94701	80 20
24	81	9.96897	9.96761	9.96621	9.96477	9.96330	9.96179	9.96024	9.95865	9.95702	9.95535	9.95364	9.95190	9.95011	9.94828	81 24
28	82	9.97010	9.96874	9.96734	9.96590	9.96443	9.96292	9.96137	9.95978	9.95815	9.95648	9.95477	9.95303	9 95124	9.94941	82 28
32	83	9.97110	9.96974	9.96834	9.96690	9.96543	9.96392	9.96237	9.96078	9.95915	9.95748	9.95577	9.95403	9.95224	9.95041	83 32
36	84	9.97196	9.97060	9.96920	9.96776	9.96629	9.96478	9.96323	9.96164	9.96001	9.95834	9.95663	9.95489	9.95310	9.95127	84 36
40	85	9.97269	9.97133	9.96993	9.96849	9.96702	9.96551	9.96396	9.96237	9.96074	9.95907	9.95736	9.95562	9.95383	9.95200	85 40
44	86	9.97329	9.97193	9.97053	9.96909	9.96762	9.96611	9.96456	9.96297	9.96134	9.95967	9.95796	9.95622	9.95443	9.95260	86 44
48	87	9.97375	9.97239	9.97099	9.96955	9.96808	9.96657	9.96502	9.96343	9.96180	9.96013	9.95842	9.95668	9.95489	9.95306	87 48
52	88	9.97409	9.97273	9.97133	9.96989	9.96842	9.96691	9.96536	9.96377	9.96214	9.96047	9.95876	9.95702	9.95523	9.95340	88 52
56	89	9.97428	9.97292	9.97152	9.97008	9.96861	9.96710	9.96555	9.96396	9.96233	9.96066	9.95895	9.95721	9.95542	9.95358	89 56
6 00	90	9.97435	9.97299	9.97159	9.97015	9.96868	9.96717	9.96562	9.96403	9.96240	9.96073	9.95902	9.95728	9.95548	9.95364	90 6 00

Hour Angle		19° 00′	19° 30′	20° 00′	20° 30′	21° 00′	21° 30′	22° 00′	22° 30′	23° 00′	23° 30′	24° 00′	24° 30′	25° 00′	25° 30′	26° 00′	Hour Angle	
h. m.	°	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	— ∞	°	h. m.
0 00	0																0	0 00
04	1	8.21621	8.21485	8.21345	8.21201	8.21054	8.20903	8.20748	8.20589	8.20426	8.20259	8.20088	8.19914	8.19735	8.19552		1	04
08	2	8.51717	8.51581	8.51441	8.51297	8.51150	8.50999	8.50844	8.50685	8.50522	8.50355	8.50184	8.50010	8.49831	8.49648		2	08
12	3	8.69315	8.69179	8.69039	8.68895	8.68748	8.68597	8.68442	8.68283	8.68120	8.67953	8.67782	8.67608	8.67429	8.67246		3	12
16	4	8.81793	8.81657	8.81517	8.81373	8.81226	8.81075	8.80920	8.80761	8.80598	8.80431	8.80260	8.80086	8.79907	8.79724		4	16
20	5	8.91465	8.91329	8.91189	8.91045	8.90898	8.90747	8.90592	8.90433	8.90270	8.90103	8.89932	8.89758	8.89579	8.89396		5	20
24	6	8.99358	8.99222	8.99082	8.98938	8.98791	8.98640	8.98485	8.98326	8.98163	8.97996	8.97825	8.97651	8.97472	8.97289		6	24
28	7	9.06024	9.05888	9.05748	9.05604	9.05457	9.05306	9.05151	9.04992	9.04829	9.04662	9 04491	9.04317	9.04138	9.03955		7	28
32	8	9.11791	9.11655	9.11515	9.11371	9.11224	9.11073	9.10918	9.10759	9.10596	9.10429	9.10258	9.10084	9.09905	9.09722		8	32
36	9	9.16868	9.16732	9.16592	9.16448	9.16301	9.16150	9.15995	9.15836	9.15673	9.15506	9.15335	9.15161	9.14982	9.14799		9	36
40	10	9.21402	9.21266	9.21126	9.20982	9.20835	9.20684	9.20529	9.20370	9.20207	9.20040	9.19869	9.19695	9.19516	9.19333		10	40
44	11	9.25495	9.25359	9.25219	9.25075	9.24928	9.24777	9.24622	9.24463	9.24300	9.24133	9.23962	9.23788	9.23609	9.23426		11	44
48	12	9.29223	9.29087	9.28947	9.28803	9.28656	9.28505	9.28350	9.28191	9.28028	9.27861	9.27690	9.27516	9.27337	9.27154		12	48
52	13	9.32644	9.32508	9.32368	9.32224	9.32077	9.31926	9.31771	9.31612	9.31449	9.31282	9.31111	9.30937	9.30758	9.30575		13	52
56	14	9.35803	9.35667	9.35527	9.35383	9.35236	9.35085	9.34930	9.34771	9.34608	9.34441	9.34270	9.34096	9.33917	9.33734		14	56
1 00	15	9.38735	9.38599	9.38459	9.38315	9.38168	9.38017	9.37862	9.37703	9.37540	9.37373	9.37202	9 37028	9.36849	9.36666		15	1 00
04	16	9.41469	9.41333	9.41193	9.41049	9.40902	9.40751	9.40596	9.40437	9.40274	9.40107	9.39936	9 39762	9.39583	9.39400		16	04
08	17	9.44029	9.43893	9.43753	9.43609	9.43462	9.43311	9.43156	9.42997	9.42834	9.42667	9.42496	9 42322	9.42143	9.41960		17	08
12	18	9.46433	9.46297	9.46157	9.46013	9.45866	9.45715	9.45560	9.45401	9.45238	9.45071	9.44900	9.44726	9.44547	9.44364		18	12
16	19	9.48699	9.48563	9.48423	9.48279	9.48132	9.47981	9.47826	9.47667	9.47504	9.47337	9.47166	9 46992	9.46813	9.46630		19	16
20	20	9.50840	9.50704	9.50564	9.50420	9.50273	9.50122	9.49967	9.49808	9.49645	9.49478	9.49307	9 49133	9.48954	9.48771		20	20
24	21	9.52868	9.52732	9.52592	9.52448	9.52301	9.52150	9.51995	9.51836	9.51673	9.51506	9.51335	9 51161	9.50982	9.50799		21	24
28	22	9.54793	9.54657	9.54517	9.54373	9.54226	9.54075	9.53920	9.53761	9.53598	9.53431	9.53260	9.53086	9.52907	9.52724		22	28
32	23	9.56623	9.56487	9.56347	9.56203	9.56056	9.55905	9.55750	9.55591	9.55428	9.55261	9.55090	9 54916	9.54737	9.54554		23	32
36	24	9.58366	9.58230	9.58090	9.57946	9.57799	9.57648	9.57493	9.57334	9.57171	9.57004	9.56833	9 56659	9.56480	9.56297		24	36
40	25	9.60030	9.59894	9.59754	9.59610	9.59463	9.59312	9.59157	9.58998	9.58835	9.58668	9.58497	9.58323	9.58144	9.57961		25	40
44	26	9.61619	9.61483	9.61343	9.61199	9.61052	9.60901	9.60746	9.60587	9.60424	9.60257	9.60086	9.59912	9.59733	9.59550		26	44
48	27	9.63140	9.63004	9.62864	9.62720	9.62573	9.62422	9.62267	9.62108	9.61945	9.61778	9.61607	9.61433	9 61254	9.61071		27	48
52	28	9.64596	9.64460	9.64320	9.64176	9.64029	9.63878	9.63723	9.63564	9.63401	9.63234	9.63063	9.62889	9.62710	9.62527		28	52
56	29	9.65992	9.65856	9.65716	9.65572	9.65425	9.65274	9.65119	9.64960	9.64797	9.64630	9.64459	9.64285	9.64106	9.63923		29	56
2 00	30	9.67332	9.67196	9.67056	9.66912	9.66765	9.66614	9.66459	9.66300	9.66137	9.65970	9.65799	9.65625	9.65446	9.65263		30	2 00
04	31	9.68619	9.68483	9.68343	9.68199	9.68052	9.67901	9.67746	9.67587	9.67424	9.67257	9.67086	9.66912	9.66733	9.66550		31	04
08	32	9.69856	9.69720	9.69580	9.69436	9.69289	9.69138	9.68983	9.68824	9.68661	9.68494	9.68323	9.68149	9.67970	9.67787		32	08
12	33	9.71046	9.70910	9.70770	9.70626	9.70479	9.70328	9.70173	9.70014	9.69851	9.69684	9.69513	9.69339	9.69160	9.68977		33	12
16	34	9.72191	9.72055	9.71915	9.71771	9.71624	9.71473	9.71318	9.71159	9.70996	9.70829	9.70658	9.70484	9.70305	9.70122		34	16
20	35	9.73294	9.73158	9.73018	9.72874	9.72727	9.72576	9.72421	9.72262	9.72099	9.71932	9.71761	9.71587	9.71408	9.71225		35	20
24	36	9.74357	9.74221	9.74081	9.73937	9.73790	9.73639	9.73484	9.73325	9.73162	9.72995	9.72824	9.72650	9.72471	9.72288		36	24
28	37	9.75381	9.75245	9.75105	9.74961	9.74814	9.74663	9.74508	9.74349	9.74186	9.74019	9.73848	9.73674	9.73495	9.73312		37	28
32	38	9.76369	9.76233	9.76093	9.75949	9.75802	9.75651	9.75496	9.75337	9.75174	9.75007	9.74836	9.74662	9.74483	9.74300		38	32
36	39	9.77322	9.77186	9.77046	9.76902	9.76755	9.76604	9.76449	9.76290	9.76127	9.75960	9.75789	9.75615	9.75436	9.75253		39	36
40	40	9.78242	9.78106	9.77966	9.77822	9.77675	9.77524	9.77369	9.77210	9.77047	9.76880	9.76709	9.76535	9.76356	9.76173		40	40
44	41	9.79129	9.78993	9.78853	9.78709	9.78562	9.78411	9.78256	9.78097	9.77934	9.77767	9.77596	9.77422	9.77243	9.77060		41	44
48	42	9.79986	9.79850	9.79710	9.79566	9.79419	9.79268	9.79113	9.78954	9.78791	9.78624	9.78453	9.78279	9.78100	9.77917		42	48
52	43	9.80813	9.80677	9.80537	9.80393	9.80246	9.80095	9.79940	9.79781	9.79618	9.79451	9.79280	9.79106	9.78927	9.78744		43	52
56	44	9.81612	9.81476	9.81336	9.81192	9.81045	9.80894	9.80739	9.80580	9.80417	9.80250	9.80079	9.79905	9.79726	9.79543		44	56
3 00	45	9.82384	9.82248	9.82108	9.81964	9.81817	9.81666	9.81511	9.81352	9.81189	9.81022	9.80851	9.80677	9.80498	9.80315		45	3 00

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SERVICES RENDERED MARINERS BY THE NAVAL COMMUNICATION SERVICE

By LIEUTENANT (J. G.) B. V. MCCANDLISH, U. S. Navy

It is hoped that the following may be of interest and value to officers who have not performed radio duty. Practically all of this information, in more detail, is given in the Commercial Traffic Regulations of the United States Naval Communication Service which is furnished to all naval ships and radio stations. Bulletins from the hydrographic office have also covered part of the subject.

The services rendered will be grouped under five heads: (1) Time Signals, (2) Hydrographic Information, (3) Meteorological Information, (4) Distress calls from Vessels, and (5) Press.

In order to make these services efficient there is very close cooperation between the naval observatories, the hydrographic offices, the weather bureau, the coast guard, and the naval communication service.

Naval ships render good service to the weather bureau by carefully carrying out Article I 1607 (2), U. S. Naval Instructions, 1913, which provides that ships send in a noon meteorological report to the U. S. Weather Bureau, Department of Agriculture, Washington, D. C. Such radiograms should be addressed "Govt. Observer, Washington." These messages are immediately placed on the telegraph wire by the shore radio station and all means taken to expedite delivery. This report is very important for there have been times when the data at hand was insufficient to make good forecasts, and requests for reports from ships have been sent out by the weather bureau. This report is in addition to and distinct from the noon position report which is to be made to the nearest radio station.

TIME SIGNAL SERVICE

Name of Station	Wave length in meters used	Time when sent
Arlington.....	2500	Every day at 11.55 a. m. to noon, and from 9.55 p. m. to 10.00 p. m., standard time, 75th meridian.
Key West	1500	Daily at 11.55 a. m., to noon, 75th meridian time.
New Orleans...	1000	Daily at 11.55 a. m., to noon, 75th meridian time.
*North Head..	2000	Daily, except Sundays and holidays, at 11.55 a. m. to noon, standard time, 120th meridian.
Eureka.....	1400	(Same as North Head.)
San Diego.....	2000	(Same as North Head.)
*San Francisco	2500	Every day at 11.55 a. m. to noon, and from 9.55 p. m. to 10.00 p. m., standard time, 120th meridian.
	4800	Undamped At same time as 2500 damped signals.
Darien	4000	Undamped. Daily at 12.55 to 1 p. m., standard time, 75th meridian.
Point Arguello.	750	(Same as North Head.)
Great Lakes, Ill.	1512	Daily at 10.55 a. m. to 11.00 a. m., standard time, 90th meridian.

*Shortly, it is expected to change some of these wave lengths to those here given: North Head, 2800; Eureka, 2000; Point Arguello, 1512; San Diego, 2400; and San Francisco, 2400.

If for any reason the Arlington station is out of commission the time signal will be sent on the same wave length from the naval radio stations at Newport, New York, Norfolk and Charleston.

The relay keys of the radio stations are connected by telegraph to a clock in the Naval Observatory at Washington for all stations sending 75th meridian time. For stations sending 120th meridian time, the relay keys are connected to a clock at the Naval Observatory, Mare Island, Calif. The lag is usually 0.02 second for Arlington and about 0.27 second for the Key West station. The error of the time signal is usually less than 0.1 second. These signals have been used for accurate determination of longitude and may be relied on for navigation purposes. Mare Island and Arlington have the smallest errors for they are connected up by direct lines to their respective observatories. The Naval Observatory is able to tell the exact error of the Arlington time signal for any time if same is desired for accurate computation.

The time signal is the same "tick" that has been in use over the telegraph lines. The signals are actuated by the same transmitting mechanism at the observatories. At five minutes preceding noon and 10.00 p. m., the clock starts ticking for every second.

The twenty-ninth second is not ticked which gives an approximate check on the chronometer error. The radio signals tick until 55^m 55^s when they stop and resume ticking at 56^m 00^s. The twenty-ninth second is again missed at 56^m 29^s and the ticks continue until 56^m 55^s when the ticks stop and resume at 57^m 00^s. The above procedure is repeated until 59^m 50^s when there is a 10 second period of quiet followed by a long dash, the beginning of which is on the instant of noon or 10.00 p. m.

HYDROGRAPHIC INFORMATION AND STORM WARNINGS

Storm warnings and hydrographic information concerning dangers to navigation are broadcasted at various times.

The Arlington station transmits these notices twice daily on 2500 meters wave length using the 100 kw. spark set. They are sent addressed to all stations just after the completion of the noon and 10.00 p. m. time signals. By request of masters of merchant ships who do their own receiving or who have indifferent operators, these warnings are sent very slowly; at a speed of about 12 words per minute. This slow speed should enable naval ships in the Atlantic Ocean and Caribbean Sea to copy these messages through heavy atmospherics.

Copies of all dispatches to the hydrographic office at Washington, which relate to dangers to navigation, are at once given to the radio station which immediately broadcasts them on the 5 kw. spark set.

The weather bureau also immediately transmits a storm warning to the Arlington radio station.

Other radio stations obtain similar information from the local weather bureau and hydrographic offices. This information and that intercepted from Arlington which differs from it is broadcasted four times daily: (local time) 8.00 a. m., noon, 4.00 p. m., and 8.00 p. m., on wave lengths of 600 and 1000 meters and is also broadcasted immediately after receipt.

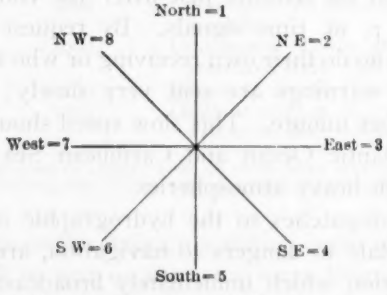
Mare Island performs the same duties for the Pacific coast that Arlington does for the Atlantic coast.

Letters which show appreciation of the aid to navigation given by the naval communication service are often received at the Department. In several cases vessels have stayed in or made port, due to these radio storm warnings, and have escaped hurricanes which sank other ships.

METEOROLOGICAL INFORMATION

In addition just after 10.00 p. m. every day the weather bureau transmits a very complete meteorological bulletin, compiled at 9.30 p. m., for the Atlantic Ocean and the Great Lakes with weather forecasts for the coming 48 hours. These bulletins use letters to represent points and give the meteorological information by figures. Example: USWB—S 96465 T 91674 D B 94686 H 99886 C 01214 K 02622 P 03613 B 00065. The first three figures represent the reading of the barometer, the fourth the direction of the wind, and the fifth its force according to the Beaufort Scale. Thus, for (s) Sydney the pressure was 29.64 inches, the wind was southwest, and its force was five.

T means Nantucket; D B, Delaware Breakwater; H, Hatteras; C, Charleston; K, Key West; P, Pensacola, and B, Bermuda.



NUMBERS USED TO REPRESENT DIRECTION OF WIND IN METEOROLOGICAL BULLETIN

The second part of the bulletin contains the forecast with perhaps a storm warning. Example: "Winds Thursday and Friday, North Atlantic Coast, brisk westerly, diminishing; Middle Atlantic, fresh westerly becoming light and variable; South Atlantic, moderate and variable; East Gulf, light northerly, becoming east to south; West Gulf, moderate southerly. Depression in St. Lawrence Valley; pressure 946 at Quebec; moving east-northeast; storm warnings displayed Eastport to Nantucket."

The meteorological bulletin sent daily just after 10.00 p. m. from San Francisco, North Head, and San Diego, is on the same wave lengths as the time signal.

An example is here given: "U S W B S F Fifth T 99661 N H 99212 E 99011 S F 98464 S D 97482 North Pacific missing Central Pacific and Southern Pacific Cloudy or Foggy Light N W wind."

The code symbols are the same as for the Atlantic except T—Tatoosh, N H—North Head, E—Eureka, S F—San Francisco, and S D—San Diego.

The ocean is divided in three parts: Northern Pacific—Tatoosh to Cape Blanco. Central Pacific—Cape Blanco to Point Arguello. Southern Pacific—Point Arguello to San Diego.

Coast radio stations copy from Washington, North Head, San Francisco, or San Diego, and repeat the storm warning if it has not been already received.

At noon each day, naval radio stations broadcast the local weather forecast as made at 8.00 a. m. by the weather bureau.

PRESS SERVICE

By courtesy of the Associated Press the naval communication service sends a news bulletin every evening to ships in the Atlantic and Pacific oceans.

The Washington station, using the 100 kw. spark set, sends at 8.30 p. m. 75th meridian time, on 2500 meters.

Key West sends the same press bulletin at 8.00 p. m. 90th meridian time on 1500 meters wave length.

News bulletins from the Associated Press are broadcasted on 2400 meters by the San Francisco Station at 2.00 a. m. and by the San Diego Station at 2.30 a. m.

VESSELS IN DISTRESS

The coast guard service comprises both the old life saving and the revenue cutter services. Coast guard stations are located along all of the coasts of the United States. They have a district organization, the district superintendent usually being a lieutenant of the coast guard. There is close touch between the naval communication service and both the shore organizations and ships of the coast guard. The coast guard ships work through the naval radio stations and all of their dispatches where possible are sent through the coast guard and the naval communication service.

The naval radio stations are kept informed of the positions of the coast guard cutters at all times. If a coast guard lookout station discovers a vessel in distress it immediately informs the coast guard district superintendent and the nearest naval radio station. The radio station informs the coast guard cutters in her zone and assistance is immediately rendered.

In 1909 a schooner was wrecked at about noon off the south coast of Long Island. The coast guard district superintendent immediately informed the Fire Island radio station. The coast guard cutter on that station was just entering New York, short of coal and provisions after a hard week at sea. The radio station established communication with the cutter but she was unable to get to the wreck before dark. The life savers could not reach the wreck on account of the surf. The schooner was breaking up and the crew pulled out in their long boat clear of the breakers.

The naval electrician-in-charge of the radio station, an ex-apprentice boy, thought of a scheme which undoubtedly saved the crew of the wreck. He told the coast guard superintendent to build a bonfire on the beach and to take the compass bearing of the anchored long boat. The coast guard officer saw the feasibility of the plan and the following radio message was sent to the coast guard cutter:

"Crew of wreck in life boat anchored bearing SSE. from bonfire near ———— coast guard station."

The cutter steamed up on the given bearing and at night with practically no delay picked up the crew. The Secretary of the Treasury wrote a letter of appreciation to the Navy Department citing the above facts.

There are many other instances where cooperation between the coast guard service and the naval communication service has saved life and property.

AIDS TO NAVIGATION

The Navy Department has fitted up the radio stations at Cape Cod, Mass., and Fire Island, N. Y., as direction finder stations. The Cape Cod station is in commission and it is hoped that Fire Island soon will be, but it must be borne in mind that these set are still in an experimental state.

The Fire Island Light vessel is being equipped with a distance determining set which utilizes the difference in velocity of sound in water and of radio signals to determine the distance of ships from the light vessel. This should be of great use to vessels navigating the approaches to New York in foggy weather.

ADDENDA

TO THE ARTICLE ON

CORRECTION OF COMPASS COURSES*

By Lieutenant Joaquin Herrera, C. N.

To Find the Error from the Magnetic and Compass Courses:

1. Call the "*Compass Course*" always (—) *and subtract* it from *the Magnetic.*

2. When the difference is positive give the *ERROR the same name* (E or W) as the *Magnetic Course*, and the contrary name when the difference is negative.

3. When the *Courses are SOUTH*, change the sign of *ERROR* as found by the above Rule.

Note.—When the *Magnetic* and the *Compass Courses* are of different names (*one E and the other W*) it is obvious that applying these Rules the Courses must be *ADDED.* Give the ERROR the sign of the *Magnetic*, unless the Courses are *SOUTH* when it will have the contrary name, in accordance also with the above RULES.

EXAMPLES

Magnetic Course =	N 12 E	N 14 E	N 18 W	N 25 W
— Compass " =	N 10 E	N 20 E	N 15 W	N 30 W
Error =	*2 E*	(—) *6 W*	*3 W*	(—) *5 E*
Magnetic Course =	S 14 E	S 32 E	S 64 W	S 34 W
— Compass " =	S 10 E	S 50 E	S 20 W	S 56 W
Error =	(—) *4 W*	*18 E*	(—) *44 E*	*22 W*
Magnetic Course =	N 15 W	N 4 W	N 16 E	N 7 E
— Compass " =	N 5 E	N 12 E	N 8 W	N 15 W
Error =	*20 W*	*16 W*	*24 E*	*22 E*
Magnetic Course =	S 20 W	S 4 W	S 12 E	S 11 E
— Compass " =	S 2 E	S 9 E	S 6 W	S 14 W
Error =	(—) *22 E*	(—) *13 E*	(—) *18 W*	(—) *25 W*

J. H. A.

* Published in Institute Proceedings, No. 166.

DISCUSSION

Logistics, Etc.

(See Page 245, Whole No. 168)

Rear Admiral Seaton Schroeder, U. S. Navy.—I have read with interest Captain Huse's paper on "Logistics, Etc." in the February number of the Proceedings, and particularly that part of it which deals with a proposed modification of methods now followed in the Navy Department. The essential statement in the matter is this: "There is a strong feeling among officers who are familiar with the practical work of the Navy Department and who have noted the loss of efficiency which results from so many heads that the Chief of Operations should exercise full authority over the Bureau chiefs." This I believe to be radically incorrect.

Diffusion of authority and responsibility can only lead to confusion and disaster; there is probably little need of advancing arguments in support of that fundamental concept; having been through the school and had our lesson, we are no longer apt to seek efficiency in unrelated efforts. The other extreme, unrestricted concentration, while perhaps the lesser of two evils, is certainly open to serious criticism; and I think that with characteristic racial agility we are in danger of flying from one extreme to the other. It is an old argument that the greatest things have been done single-handed by the great masters in various fields in the past, and many supermen have been cited as instances of one-man power working wonderful results. But, in the first place, it may be suggested that even in the United States Navy we cannot confidently rely upon an uninterrupted supply of supermen succeeding each other every three or four years. Reflection will also develop recognition that in the comparatively crude affairs of times past the agencies through which the superman worked his wonders were not so numerous nor so complex as to challenge the power of supervision of one mortal. As the progress in the mechanical arts has come to place more, and more complex, agencies at the command of the leaders, those leaders have come to lean more and more upon collaborators, until recognition of human limitations is fairly universal Probably none will more readily accord this than the men who control the vast civil industries which form the wonder of the world to-day. What obtains in civil life may well be accepted as a guide in military affairs; indeed it is an even more important consideration in an organization of interests so diversified as those of a navy than it is in that of an industrial concern in which all interests are those of the producer.

Assuming that supervision of details may adversely affect the final wielding, by the same human being, of the vast power forged by coordination, the question arises as to how and where it is advisable to place a limit. I think the essayist has made a happy point in likening the situation to that of the cooperation of producer and consumer, and I would assign the various activities of the department to one or the other of two such

groups; but I should advise a different grouping. The essayist argues that the marine corps, being an organization complete in itself, should be in operations, the consumer, although he places the naval personnel in logistics, the producer. I can see no logical, nor extra-logical, reason for the conclusion that the marine personnel should be under a different head from the navy personnel; the duties of the two corps are virtually identical so far as the direction of their energies is concerned, and they are coincidently dependent for medical care and food and pay and transport upon the facilities of the strictly naval establishment. If the navy personnel should be in the logistics group, then the marine personnel should likewise be there. But, while putting all personnel in that group seems logical and in keeping with the precise plan that considers gunnery and aviation as products just as much as guns and airplanes, the logic seems to me to be academic rather than practical. There is a very intimate connection between personnel and operations,—much more so than between personnel and matériel; and the natural line of cleavage seems to pass so as to leave on one side all that has to do with the production of material and on the other all that has to do with using (consuming) it. Therefore I should say that all personnel bureaus, meaning the bureaus of navigation and medicine and surgery and the marine corps, would better be under the immediate control of operations.

I now come to another slight parting of the ways in not being able to agree to the proposition that "The office of Assistant Secretary of the Navy offers a suitable title and position for the person selected for the task" of coping with the problems to be handled in grouping the activities of logistics, using this term in the broad sense adopted in the essay. The essayist says elsewhere that the head of that group should be the best technical expert available. Is the Assistant Secretary of the Navy apt to be the best technical expert available? Or rather, is it possible that he should be? We have been fortunate in having for that important office men of energy and capacity; but it seems rather optimistic to hope that great technical expertness, combined with those qualities, will always be the predominant, and yet not a prohibitive, factor in selecting men for that office. Also, in the frequent necessary absences of the secretary, the assistant secretary becomes the acting secretary and anomalous situations might arise. It seems to me to be clear that that is not the best solution. The head of the logistics group should be a professional man versed in the methods of the service, technically familiar with the activities of the bureaus, and naturally able to coordinate them so that the chief of operations may simply call upon him for the means of doing what is required to be done.

In seeking the person best qualified for this position at the head of logistics, one does not have to go far before meeting a suggestion furnished by a part of an organization attempted by a former administration. Some years ago a system was adopted which was based upon four aids—one for operations, one for material, and two others which were considered by some to be superfluous. After several changes, that system was virtually abandoned, the sole survivor being the aid for operations, whose

office, legalized and rechristened, has been expanded to its present proportions. To use one of the similes that are brought into frequent use by our racial tendency to sudden and drastic changes, if any, may we not consider that the pendulum has perhaps swung too far and that in settling back it may profitably come to rest with two aids to the secretary? Accepting, as I think many will, that the diversity of responsibilities is now such as to render advisable two points of concentration, it seems logical to have two trained men as the two coordinating factors—one, a line officer, being chief of operations (including personnel), and the other, either a line officer or a naval constructor, being chief of logistics or (preferably, I think) director of material, or chief of material. Of the two, the chief of operations should be, as now, an admiral senior to all other officers afloat or ashore; the director of material may well have the temporary rank of vice admiral, or at least rear admiral and senior to the bureau chiefs.

The super-coordinating factor is, and of course must be, the Secretary of the Navy, should any occasion arise for composing differences. And in this connection I would wish to quote and emphasize the final expression in the essay, namely, that this organization "far from diminishing the importance of the Secretary of the Navy, enhances his importance and authority by liberating him from a multiplicity of unfamiliar details and leaves him free to exercise control and supervision, select the right man for each task, and direct the whole machine."

A Plea for the Battle-Cruiser

(SEE PAGE 1897, WHOLE NO. 160)

ASSISTANT NAVAL CONSTRUCTOR B. SAUNDERS BULLARD, U. S. Navy—In regard to an article by me published in the November-December issue of the PROCEEDINGS of the Naval Institute for 1915, entitled "A Plea for the Battle-Cruiser," I desire to state that from September, 1913, to May, 1916, I was a student at the Massachusetts Institute of Technology, where Professor William Hovgaard is the instructor in practical and theoretical warship design. Inadvertently and most unfortunately, I find that many of his ideas and conclusions which he presents in his series of lectures, and many of which he has presented in his "Notes on the Historical Development of Warships," and in an article published in the *Transactions of the Institute of Naval Architects* for 1905, entitled "The Cruiser," in which he analyzed the functions of this class of ship, and coined the word "battleship-cruiser," have been included in the above mentioned article published under my name. I wish to take this opportunity to give Professor Hovgaard full credit for those ideas and conclusions which are his and to express my sincere admiration and respect for him as an instructor and clear thinker on all matters, both tactical and technical relating to the field of warship design; and also I wish to express my appreciation of the fact that I have had the honor of being a student under him, thus having the opportunity of absorbing his clear-cut ideas in regard to naval matters.

You will greatly oblige me if you will print this letter in the PROCEEDINGS of the Institute.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Important Notice

The Board of Control on the occasion of its December meeting decided to grant to enlisted men the privilege of purchasing the Institute's publications on the same terms as are extended to the midshipmen at the Naval Academy. On all orders for ten or more copies of the same publication and on all orders amounting to $10.00 the price charged will be the same as that charged by the midshipmen's storekeeper, plus carriage; for individual orders, the terms are as advertised in the Institute's "Book List."

Officers of the fleet and training stations—especially division officers—are requested to keep their men informed as to the benefits to be derived from subscriptions to the Institute, from its publications, and from its book department.

There seems to be some misunderstanding on the part of the enlisted personnel as to the terms of subscription to the Institute PROCEEDINGS, subscriptions to the amount of $3.00 having been received. Enlisted men may receive the PROCEEDINGS as subscribers on the same terms as regular members, viz.—at $2.00 per year. Subscribers desiring their subscriptions to continue are urged to send in their names as "continuing subscribers," with the understanding that the subscription is to run until cancelled. In this case the first number of the new year's issue will be sent out with notice that the new subscription is due; this will prevent a break in sequence and delays in the receipt of PROCEEDINGS.

Suggestions Invited

Comment and suggestions relative to the make-up of the PROCEEDINGS are invited from all members interested in the welfare of the Institute. It is believed that the scope of usefulness of the PROCEEDINGS to members can be increased and all members are invited to assist in this work. Should any topic, on which you think an article could well be written, occur to you, send it to the Secretary and Treasurer, together with such explanation or comment as may appear desirable in order that the intent of the suggestion may be

clearly understood. The Institute is desirous of obtaining good "sea yarns" for publication. It is hoped that any one who can spin such a yarn will submit it.

Membership

Since February 17, 1917, 34 regular and 21 associate members have joined the Institute. One regular member has transferred to life membership, and one joined as life member.

The following have died:

Capt. E. E. Capehart, U. S. N., February 20, 1917,
Ensign C. F. Angel, U. S. N., February 26, 1917, and
Rear Admiral V. L. Cottman, U. S. N., March 6, 1917.

Amendments to Constitution

Members are urged to send in their ballots on the proposed changes in the Constitution of the Institute. As explained in the memorandum issued by the Board of Control, no action can be taken unless a *majority* of the members send in their ballots. To date about 40 per cent of the members have done so.

Bureau of Information

The Institute offers its services as a "Bureau of Information" on professional questions and will endeavor to obtain replies from the best qualified sources. Those "Questions and Answers" which are suitable for purposes of general information, will appear in the PROCEEDINGS. It is suggested that knotty questions which come up in professional examinations for promotion may well be submitted to this department.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers. Bills will be rendered upon delivery of books.

The Book Department is compiling a list of professional books by subjects, and is prepared to submit lists of standard works to members and subscribers desiring such information. Lists of these books will be published in the May PROCEEDINGS.

Illustrations Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Annual Dues The annual dues for 1917 became payable on January 1, 1917. It is suggested that dues be paid in lump sums covering a period of two to five years; this method of payment has advantages for members as well as for the Institute and is practiced by a number of members, both regular and associate. Response to this notice will save the Institute a considerable sum in stationery and postage.

Notice Whole Nos. 145, 146, 147, 149, 155 and 166 of the PROCEEDINGS (March, 1913, June, 1913, September, 1913, January-February, 1914, January-February, 1915, and November-December, 1916) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

Address of Members All members are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS are to be sent, and thus insure their receipt.

This precaution is now of particular importance as notices of changes of station are not now available for the use of the Institute's staff.

Non-receipt of Proceedings Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of each month.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Notice to Newsdealers

The discount to newsdealers is now 10 per cent, instead of the 25 per cent heretofore allowed on subscriptions.

ANNAPOLIS, MD., March 16, 1917.

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GERMAN DESTROYER "V-69," AT YMUIDEN AFTER THE ACTION ON JANUARY 22
(Photo from Underwood and Underwood, New York)

German Destroyer "V-69," at Ymuiden After the Action on January 22
(Photo from Underwood and Underwood, New York)

PROFESSIONAL NOTES

Prepared by Lieutenant R. S. Edwards, U. S. Navy

GENERAL ARRANGEMENT

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Note.—Ship construction in the nations at war is held confidential and no reliable information is available.

GERMANY

The New German Submarines.—The new type of German submarine boats for extensive cruising are described in German papers as being of 2400 tons, 260 feet long, 25 feet wide, with 19,000 horsepower and a crew of from 60 to 80 men. Their speed on the surface is said to be 26 knots, and submerged 14 knots. They are credited with having a radius of 8000 miles, carrying supplies for an eight weeks' cruise. The shell of the submarine, it is claimed, is sufficiently heavy to permit them to submerge to a depth of 200 meters. The German papers also assert that Germany has 10 new submarines of 5000 tons, 400 feet long, which have a cruising radius of 18,000 miles. The armor and gun equipment are sufficiently heavy to permit them to engage in battle with the ordinary type of cruiser of similar displacement. Nearly 100 of the new type are said to be engaged in the present blockade. They were built during 1916, and about 100 more are said to be in process of construction at Hamburg, Bremen and Kiel.—*Army and Navy Journal*, 16/2.

GREAT BRITAIN

Merchant Ships to be Built in United States.—It is reported that the Union Iron Works has contracted to build three 10,000-ton freighters for British shipping concerns, and the Sparrows Point branch of the Bethlehem Steel Co. has received contracts for two similar vessels for the Cunard Co. It is stated that this is the first time in 50 years that Great Britain has ordered a ship built in this country.

Standard Ships.—The standard ships which Sir Joseph Maclay has ordered on behalf of the state are to be vessels of about 4000 tons gross.

Their propelling machinery is to be of about 2000 i. h. p., and their speed will be about 10 or 11 knots. They are what the average shipbuilder would call "very simple jobs," although in some quarters the opinion prevails that the simplicity might profitably have been carried further. Only one standard type has so far been ordered.

In shipbuilding circles it is understood that the number of standard cargo vessels which the shipping controller has ordered for the service of the state is about 40. The ships, are not, of course, the only merchant ships for whose construction facilities are to be given, as a considerable number of the certified vessels which are in progress will also be beneficially affected. Many of the latter are liners of larger dimensions than the standard craft, but although some of them are to have accommodation for passengers, the factor which decided the authorities to certify them was their cargo carrying capacity. Provided the labour-pooling arrangements and the greater provision for the manufacture of steel work out as anticipated there should be a marked improvement in the output of merchant ships between now and mid-summer.—*Pages Engineering Weekly*, 26/1.

THE PERSONNEL OF GREAT BRITAIN'S NAVY.—The navy estimates, issued February 24, place the total number of officers and men at 450,000.

LORD FISHER AND THE ADMIRALTY.—In *Land and Water* Mr. Arthur Pollen, in discussing the possible return of Lord Fisher to the Admiralty, criticizes the "Fisher system" as follows:

". . . . But the navy's objection to Lord Fisher's return to Whitehall is not merely that he has been famed for the creation of discord. The chief vice of the Fisher system was this: The first sea lord was to be an autocrat. He was surrounded by advisers, controller, director of naval ordnance, etc.; each of whom was an autocrat too, so long, of course, as he did not interfere with the major autocracy of his chief. The effect of this was to create a special caste quite distinct and, with one or two notable exceptions, quite foreign to the naval service. It could only continue by the suppression of all independent thinking in the navy. The Fisher system was then the flat negation of the staff system. There was a moment in the first few weeks of 1912, when it looked as if Mr. Churchill intended to replace the old irrational, autocratic régime by a staff régime, but if he ever had any such intention, he was soon deflected from it, so that the old system survived. At the outbreak of war, the navy found itself without any staff organization for the study of the use of weapons, either for the discovery of the best method of employing them ourselves, or of counteracting their use in the enemy's hands. How appalling were the risks we ran through there being no harbor protected against German submarines has been amply explained to us by Mr. Balfour.

"If there had been any pretence of a real war staff at Whitehall, we should not have had to learn the art of tackling the submarine attack on trade only after that attack had begun. We should have concentrated our attention, not on building submarines that would never have a target to shoot at, but on developing means of counteracting the enemy's submarines who would have our fleet and merchantmen as their daily prey.

"It will take a very long time indeed for the navy to recover from the system of absolutism and opposition to staff organization which Lord Fisher instituted. Now war has, against everybody's will, made sensible inroads into this system. As we saw last week, the submarine war has at last been definitely put upon a staff basis. We may, I think, safely assume that everything to do with the command of the fleet is on a similar basis. Perhaps some day gunnery methods, mining methods, torpedo methods, even naval tactics and naval strategy may be made the subjects of staff study! There is no road to infallibility. But staff methods, at any rate, promise immunity from the grossest form of error."

NETHERLANDS

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Cruisers					
.....	6000	30	10 6-in.	Amsterdam	
.....	6000	30	10 6-in.	Flushing	

NOTE.—Four submarines are building, three at Rotterdam and one at Flushing, of 836 tons displacement and a surface speed of 17¼ knots. The two cruisers were to be built in Holland by Krupp, and it is not known whether or not construction is proceeding.

The budget for 1917 provides for the construction of three more submarines and a mine layer.

JAPAN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Ise (or She)...	30,800	22.5	12 14-in.	Kawasaki	Launched 11-11-16.
Huga.....	30,800	22.5	12 14-in.	Mitsubishi	
Nagato.....	32,000	24.0	12 15-in. (?)	Kure Arsenal	

NOTE.—On April 1, 1916, Japan had nine destroyers under construction.

JAPAN'S NAVAL PROGRAM.—"Japan's naval program calls for the commissioning of seven battleships of the strength of the *Arizona* by 1923," says a Tokio dispatch, which apparently was passed by the official censor there.—*Army and Navy Journal.*

JAPANESE MERCHANT SHIP LOSSES IN THE WAR.—Japan's loss of tonnage through the war has been comparatively slight, only six steamers under the Japanese flag, with an aggregate tonnage of 26,000 tons, having been sunk by the Central Powers, and three are missing, making a total of 38,000 tons. On the other hand, Japan's expansion in trade to foreign countries is put at 800,000 tons of cargo carriers.—*Marine Journal,* 3/3.

RUSSIA

GROWTH OF THE RUSSIAN FLEET.—Norwegian newspapers tell of great activity in the shipyards of Russia. In Petrograd two dreadnoughts have been built, but thus far they have not been equipped with guns, owing to delay in their delivery. The ships are 200 meters in length and have a beam of 30 meters.

The Putilow works are building many destroyers, while the Admiralty works are constructing three big battleships. The Baltic works are building four destroyers and the Newski works three submarines. The government works in Reva are building a big battle cruiser, the Nobel works eight destroyers and Lang & Bocker a turbine cruiser.

Work is going on day and night on the fortifications at Reval and Varo, while the harbor is being deepened to permit such ships as the *Andrej Pervosvani* class and battleships of the *Petropawlowsk* and the *Bardina* class to enter. The British Government has promised the delivery of 40 submarines, and also will send to Russia 200 marine officers to assist in bringing the Russian fleet to the highest state of efficiency.

The Russian fleet now has 51 flag officers, 429 captains, 739 lieutenants, 450 midshipmen and 50,000 seamen.—*New York Herald,* 3/3.

SPAIN

VESSELS BUILDING.—There are building or projected three 15,000-ton battleships, four 5600-ton cruisers, six destroyers, and 28 submarines.

UNITED STATES

UNITED STATES VESSELS BUILDING AND AUTHORIZED

NOTE.—The Navy Department has discontinued reports of the degree of completion of vessels; the latest information is dated January 1, 1917.

	Vessels	Displacement	Main battery	Speed	Number Shafts	Engines*	Where building †	% completed Jan. 1, 1917 Hull	Machy.
	Battleships								
40	New Mexico ..	32,000	12 14-in.	21	4	El	New York (N)..	58	20
41	Mississippi....	32,000	12 14-in.	21	4	Ct Gc..	Newport News..	67	60
42	Idaho	32,000	12 14-in.	21	4	Pt Gc..	Camden.....	68	67
43	Tennessee	32,300	12 14-in.	21	4	El	New York (N)..	6	0
44	California	32,300	12 14-in.	21	4	El	Mare Island (N)	8	0
45	Colorado.....	32,600	8 16-in.	21	4	El	Camden	0	0
46	Maryland.....	32,600	8 16-in.	21	4	El	Newport News..	0	0
47	Washington ..	32,600	8 16-in.	21	4	El	Camden	0	0
48	West Virginia.	32,600	8 16-in.	21	4	El	Newport News..	0	0
	Battle Cruisers								
1	.....	34,800	10 14-in.	35	4	El	Newport News..	0	0
2	.....	34,800	10 14-in.	35	4	El	Newport News..	0	0
3	.....	34,800	10 14-in.	35	4	El	Camden	0	0
4	.....	34,800	10 14-in.	35	4	El	Fore River.....	0	0
5	.....	34,800	10 14-in.	35	4	El	Philadelphia(N)	0	0
	Scout Cruisers								
4	.....	7,100	8 6-in.	35	4	Pt G....	Seattle	0	0
5	.....	7,100	8 6-in.	35	..	.....	Seattle	0	0
6	.....	7,100	8 6-in.	35	..	.....	Cramp's.....	0	0
7	.....	7,100	8 6-in.	35	..	.....	Cramp's.....	0	0
8	.....	7,100	8 6-in.	35	..	.....	Union Iron Wks	0	0
9	.....	7,100	8 6-in.	35	..	.....	Union Iron Wks	0	0
	Destroyers								
66	Allen.....	1,071	Four 4-inch guns and four triple torpedo tubes.	30	2	Pt G....	Bath	99	100
68	Shaw.....	1,110		29.5	2	Pt G....	Mare Island (N)	97	92
69	Caldwell	1,085		32	2	Ct G....	Mare Island (N)	35	7
70	Craven.....	1,085		32	2	Pt G....	Norfolk (N).....	19	3
71	Gwin.....	1,123		30	2	Pt G....	Seattle	12	8
72	Conner.....	1,121		30	3	Pt Gc..	Cramp's	28	29
73	Stockton	1,121		30	3	Pt Gc..	Cramp's	28	27
74	Manley	1,085		32	2	Pt G....	Bath....	48	53
75	.....	1,085		35	2	Pt G....	Bath	0	0
76	.....	1,085		35	2	Pt G....	Bath	0	0
77	.....	1,085		35	2	Pt G....	Bath	0	0
78	.....	1,085		35	2	Pt G....	Bath	0	0
79	.....	1,085		35	2	Ct G....	Fore River.....	0	0
80	.....	1,085		35	2	Ct G....	Fore River.....	0	0
81	.....	1,085		35	2	Ct G....	Fore River.....	0	0
82	.....	1,085		35	2	Ct G....	Fore River.....	0	0
83	.....	1,085		35	2	Ct G....	Fore River.....	0	0
84	.....	1,085		35	2	Ct G....	Fore River.....	0	0
85	.....	1,085		35	2	Ct G....	Fore River.....	0	0
86	.....	1,085		35	2	Ct G....	Fore River.....	0	0
87	.....	1,085		35	2	Ct G....	Union Iron Wks	0	0
88	.....	1,085		35	2	Ct G....	Union Iron Wks	0	0
89	.....	1,085		35	2	Ct G....	Union Iron Wks	0	0
90	.....	1,085		35	2	Ct G....	Union Iron Wks	0	0
91	.....	1,085		35	2	Ct G....	Union Iron Wks	0	0
92	.....	1,085		35	2	Ct G....	Union Iron Wks	0	0
93	.....	1,085		35	2	Pt G....	Mare Island (N)	0	0
94	.....	1,085		35	2	Pt G....	Mare Island (N)	0	0
	Gunboats								
21	.....	1,575	3 4-in.	12	1	Pt G....	Charleston (N)..	0	0
	Fuel Ships								
15	Cuyama	14,500	.....	14	2	R	Mare Island (N)	92	91
16	.....	14,500	.....	14	2	R	Boston (N).....	0	0
	Supply Ships								
1	Bridge.....	8,500	.....	14	2	R	Philadelphia (N)	92	67
	Transports								
1	Henderson	10,000	.....	14	2	R	Philadelphia (N)	96	73
	Hospital Ships								
1	.....	9,800	.....	16	2	Pt G....	Philadelphia (N)	1	0
	Ammunition Ships								
1	.....	.....	.....	16	2	Pt G....	Puget Sound (N)	0	0

* El. Electric drive. Gc. Geared cruising turbines.
Ct. Curtis turbines. G. Geared turbines.
Pt. Parsons turbines. R. Reciprocating engines.
†(N) Signifies building at Government Navy Yard.

UNITED STATES VESSELS BUILDING AND AUTHORIZED—CONTINUED

Vessels	Surface Speed	Engines*	No. Cylinders	Builders	% completed Jan. 1, 1917	
					Hull	Machy.
Submarines						
44 L-5	14	DS	2	Lake (Bridgeport)	89	97
45 L-6	14	DS	2	Lake (Long Beach)	87	91
46 L-7	14	DS	2	Lake (Long Beach)	86	80
47 M-1	14	DL	2	E. B. Co. (Quincy)	99	98
48 L-8	14	DS	2	Portsmouth Navy Yard	93	47
52 Schley	20	DL	4	E. B. Co. (Quincy)	36	49
53 N-1	13	DL	4	E. B. Co. (Seattle)	84	89
54 N-2	13	DL	4	E. B. Co. (Seattle)	80	86
55 N-3	13	DL	4	E. B. Co. (Seattle)	72	82
56 N-4	13	DS	2	Lake (Bridgeport)	83	46
57 N-5	13	DS	2	Lake (Bridgeport)	80	48
58 N-6	13	DS	2	Lake (Bridgeport)	75	44
59 N-7	13	DS	2	Lake (Bridgeport)	74	45
60	20	DL	4	E. B. Co. (Quincy)	14	7
61	20	DL	4	E. B. Co. (Quincy)	14	7
62 O-1	14	DL	4	Portsmouth Navy Yard	0	23
63 O-2	14	DL	4	Puget Sound Navy Yard	3	23
64 O-3	14	DL	4	E. B. Co. (Quincy)	32	21
65 O-4	14	DL	4	E. B. Co. (Quincy)	32	21
66 O-5	14	DL	4	E. B. Co. (Quincy)	32	21
67 O-6	14	DL	4	E. B. Co. (Quincy)	32	21
68 O-7	14	DL	4	E. B. Co. (Quincy)	31	21
69 O-8	14	DL	4	E. B. Co. (Quincy)	31	16
70 O-9	14	DL	4	E. B. Co. (Quincy)	31	16
71 O-10	14	DL	4	E. B. Co. (Quincy)	31	16
72 O-11	14	DS	4	Lake (Bridgeport)	48	16
73 O-12	14	DS	4	Lake (Bridgeport)	47	17
74 O-13	14	DS	4	Lake (Bridgeport)	44	17
75 O-14	14	DS	4	California Ship Bldg. Co. (Long Beach)	34	11
76 O-15	14	DS	4	California Ship Bldg. Co. (Long Beacn)	33	7
77 O-16	14	DS	4	California Ship Bldg. Co. (Long Beach)	34	7
78	13½	DL	4	E. B. Co	0	0
79	13½	DL	4	E. B. Co	0	0
80	13½	DL	4	E. B. Co	0	0
81	13½	DL	4	E. B. Co	0	0
82	13½	DL	4	E. B. Co	0	0
83	13½	DL	4	E. B. Co	0	0
84	13½	DL	4	E. B. Co	0	0
85	13½	DL	4	E. B. Co	0	0
86	13½	DL	4	E. B. Co	0	0
87	13½	DL	4	E. B. Co	0	0
88	13½	DL	4	E. B. Co	0	0
89	13½	DL	4	E. B. Co	0	0
90	13½	DL	4	E. B. Co	0	0
91	13½	DL	4	E. B. Co	0	0
92	13½	DL	4	E. B. Co	0	0
93	13½	DL	4	E. B. Co	0	0
94	13½	DL	4	E. B. Co	0	0
95	13½	DL	4	E. B. Co	0	0
96	14	DS	4	Lake	0	0
97	14	DS	4	Lake	0	0
98	14	DS	4	Lake	0	0
99	14	DS	4	Lake	0	0
100	14	DS	4	Lake	0	0
101	14	DS	4	Lake	0	0
102	14	DS	4	Lake	0	0
103	13½	DL	4	E. B. Co	0	0
104	13½	DL	4	E. B. Co	0	0
105	13½	DL	4	E. B. Co	0	0
106	16	DS	2	Lake	0	0
107	15	DL	4	E. B. Co	0	0

* DS. Diesel (Sulzer) engines.
DL. Diesel (New London) engines.

THE NAVAL APPROPRIATION BILL.—The Naval Appropriation Bill as passed by the House was published in the March issue of the PROCEEDINGS. The *Army and Navy Register* gives the amendments proposed by the Senate as follows:

Increase in Appropriations

Pay, miscellaneous	$134,000
Recruiting, navigation	100,000
Naval training station, California, maintenance	7,000
Naval training station, Rhode Island, Maintenance	10,000
Naval training station, Great Lakes, maintenance	6,400
Projectile plant	669,734
Batteries for merchant auxiliaries	600,000
Ammunition for merchant auxiliaries	450,000
Maintenance, bureau of yards and docks	709,000
Public works:	
Improvements, central power plant, Boston	150,000
Extension of chain shop, Boston	60,000
Gun shop, Washington	500,000
Central power plant improvements, Washington	772,000
Purchase of land, marine recruiting station, Port Royal	5,000
Clothing factory, Charleston	300,000
Enlarge dry dock, Charleston	750,000
Navy aeronautic station, Pensacola	125,000
Naval proving ground, Indian Head	22,000
Naval magazine, Charleston	85,000
Naval training station, San Francisco, contagious wards	25,000
Marine guard, American legation, Pekin, barracks and laundry	62,000
Marine barracks, Mare Island, California	12,000
Reimbursement for property damaged at Indian Head	205
Lighting facilities at navy yards and stations	200,000
Repairs and preservation at navy yards and stations	455,000
Clothing and small stores fund	1,500,000
Reserve material for the navy	3,000,000
Maintenance, bureau of supplies and accounts	500,000
Construction and repair of vessels	1,350,000
Construction of coast guard cutters	675,000
Engineering	1,950,000
High power radio station, Porto Rico	400,000
Naval Academy:	
Commissary department, pay of employes	8,020
Current and miscellaneous expenses	2,500
Maintenance and repairs	75,000
Pay of civil force, marine corps	200
Increase of the navy, torpedo boats	35,000,000
Navy emergency fund	115,000,000
Additional navy yard on San Francisco Bay	1,500,000
Test of Talbott boiler	30,000

Additional Legislation

Appropriating $14,000 for storage facilities at Norfolk.

Consolidating the balances under the several items of the appropriation "national advisory committee for aeronautics" in the act of August 29, 1916.

That hereafter the Secretary of the Navy may authorize the senior officer present, or other commanding officer, on a foreign station to order boards of medical examiners, examining boards, and retiring boards for the examination of such candidates for appointment, promotion, and retirement in the navy and marine corps as may be serving in such officer's command and may be directed to appear before any such board.

Increasing amount available for a projectile plant and removing the limit of cost thereof.

Experimental and Research Laboratory.—A proviso that nothing in this or any other act shall be construed as preventing or interfering with the continuation or undertaking of necessary experimental work during the fiscal year ending June 30, 1918, as heretofore conducted under other appropriations for the naval establishment.

Appropriating $200,000 for improvements, lighting facilities to facilitate night work, at navy yards and naval stations.

Authorizing the Secretary of the Navy to enter into contract for the use by the United States Government of a dry dock at Boston.

That hereafter there shall be allowed at the Naval Academy four midshipmen for each senator, representative, and delegate in Congress, one for Porto Rico, two for the District of Columbia, 15 appointed each year at large, and four Filipinos (one for each class), as now authorized by law. The course of instruction at the Naval Academy is hereby reduced from four to three years for a period of five years, and the present first and second classes at the academy shall be graduated in March and in September of 1917, respectively.

That the time served by dental surgeons as acting or acting assistant dental surgeons shall be reckoned in computing the increased service pay and service for promotion of such as are commissioned under said act.

The provisions of section 3 of the act of October 1, 1890, entitled "An act to provide for the examination of certain officers of the Army and to regulate promotions therein," are hereby made applicable to commissioned officers of the coast guard of corresponding rank who have been, or may hereafter be, retired.

For purchase of clothing and small stores for issue to the naval service, the present fund being inadequate to meet the requirements of the service at this time; to be added to the "clothing and small-stores fund," $1,500,000.

For procuring apparatus and materials (other than ordnance materials and medical stores) as a war reserve necessary to be carried in the supply departments for the purpose of fitting out vessels of the fleet and merchant auxiliaries in time of war or when, in the opinion of the President, a national emergency exists, to be immediately available and to continue available until expended, $3,000,000: *Provided*, That to prevent deterioration such materials shall be used as required in time of peace, and when so used reimbursement shall be made to this appropriation from current naval appropriations in order that additional stocks may be procured.

That the President of the United States is authorized to appoint Leonard G. Hoffman, secretary to the late admiral of the navy, a passed assistant paymaster in the United States Navy, as an additional number, to take rank next after Passed Assistant Paymaster Maurice H. Karker, United States Navy: *Provided*, That the services of the said Leonard G. Hoffman as secretary to the late admiral of the navy shall, for all purposes, be credited to him as service in the navy.

Appropriating $8000 for the installation of a pneumatic tube between the communication office in the State, War and Navy Department Building and the branch communication office in the Navy Annex.

For the establishment of a high power radio station on the Island of Porto Rico, $400,000, to be available until expended.

That $75,000 is made immediately available for altering, furnishing, lighting, and equipping the marine barracks at Annapolis as temporary quarters for housing and messing midshipmen.

That marine gunners and quartermaster clerks of the Marine Corps assigned to foreign-shore service shall hereafter be entitled to the same increased compensation and under the same conditions as is now or hereafter allowed by law to commissioned officers of the marine corps.

The Secretary of the Navy is authorized and directed to proceed at once to cause to be constructed 40 coast submarines at a cost not to exceed $1,300,000 each and 10 fleet submarines at a cost not to exceed $1,900,000 each on the most approved lines according to plans and specifications to be provided by the Secretary of the Navy. These are in addition to the house program of 18 coast submarines of 800 tons each and one submarine tender. The same may be let to private builders or constructed by the government in navy yards, or both, as may be directed by the Secretary of the Navy. Not less than five of the said fleet submarines and not less than 20 of the said coast submarines shall be constructed on the Pacific coast. Thirty-five million dollars, or so much thereof as may be necessary, is hereby especially appropriated for commencing and carrying on work upon said submarines.

That in case of national emergency the President is authorized to suspend provisions of law prohibiting more than eight hours' labor in any one day of persons engaged upon work covered by contracts with the United States: *Provided*, That the wages of persons employed upon such contracts shall be computed on a basic day rate of eight hours' work, with overtime rates to be paid for at not less than time and one-half for all hours' work in excess of eight hours.

To enable the President to secure the more economical and expeditious delivery of materials, equipment, and munitions and secure the more expeditious construction of ships authorized and for the purchase or construction of such additional torpedo-boat destroyers, submarine chasers, and such other naval small craft, including aircraft and ammunition for all of said vessels, and for each and every purpose connected therewith, as the President may direct, to be expended at the direction and in the discretion of the President, $115,000,000, or so much thereof as may be necessary, and to be immediately available.

The establishment of an additional navy yard in San Francisco Bay is authorized on such site as may be recommended as most suitable by the navy yard commission.

The Secretary of the Navy is authorized to expend $30,000 for the purchase and testing of one Talbott boiler to ascertain the feasibility of using the Talbott boiler on battle cruisers.

That section 44 of the act approved March 4, 1909, be amended to read as follows: "Whoever shall wilfully trespass upon, injure, or destroy any of the works or property or material of any submarine mine or torpedo or fortification or harbor-defence system owned or constructed or in process of construction by the United States, or shall wilfully interfere with the operation or use of any such submarine mine, torpedo, fortification, or harbor-defence system, or shall knowingly, wilfully, or wantonly violate any duly authorized and promulgated order or regulation of the President governing persons or vessels within the limits of defensive sea areas, which defensive sea areas are hereby authorized to be established by order of the President from time to time as may be necessary, in his discretion, for purposes of national defence, shall be punished on conviction thereof in a district or circuit court of appeals of the United States for the district or circuit in which the offence is committed, or into which the offender is first brought, by a fine of not more than $5000, or by imprisonment for a term not exceeding five years, or by both, in the discretion of the court.

The bill as finally passed and signed by the President on March 4, is thus summarized in the *Army and Navy Register.*

The naval appropriation bill was passed by the Senate just before the filibuster became active, and, although many amendments intended to be proposed were not considered, it was finally agreed to and signed by the President on March 4. All appropriations were made immediately available.

The building program as recommended by the House naval committee—3 battleships, 1 battle cruiser, 3 scout cruisers, 15 destroyers, 1 destroyer tender, 1 submarine tender, and 18 coast submarines of 800 tons displacement—was adopted with an additional provision, a modification of a Senate amendment, for 20 additional coast submarines, of similar type, to be built on the Pacific coast, provided the cost does not exceed the cost on the Atlantic coast plus the cost of transportation of material from the Atlantic to the Pacific.

The amendment for a complimentary navy yard at San Francisco was not adopted.

The House refused to consider the Senate amendment providing a bond issue of $150,000,000 to take care of the proposed speeding up of the building program and the cost of the additional submarines. This was subsequently taken care of in a joint resolution.

The Secretary of the Navy was given $12,000,000 with which to equip navy yards for ship building, in addition to the $6,000,000 appropriated last year.

A contract for use of the dry dock at Boston was authorized.

A provision provides that officers in the staff corps shall be required to pass satisfactory examinations when promoted from rank as well as from grade to grade as heretofore obtaining.

This legislation is not to be construed as in any way effecting the original appointment of officers to the dental corps as provided in the act approved August 29, 1916, and the time served by dental surgeons as acting or acting assistant dental surgeons is to be reckoned in computing the increased service pay and service for promotion of such as are commissioned under said act.

The senate requirement for examinations and pay similar to officers of the medical corps was not adopted.

Provision is made for the annual appointment of 100 enlisted men as midshipmen at the Naval Academy.

The President, in his discretion, is authorized to reduce the course of instruction at the Naval Academy from four to three years for a period of two years from the date of the approval of the act and may during said two years graduate classes which have completed a three year course.

The Senate amendment was adopted providing that officers of the corps of civil engineers hereafter appointed shall, from the date of their original appointment, take rank and precedence with lieutenants (junior grade).

The President is authorized to appoint Leonard G. Hoffman, secretary to the late admiral of the navy, an assistant paymaster in the navy, as an additional number in said grade or to any grade to which he may hereafter be promoted. He will be entitled to count the period of service as secretary for purposes of pay.

It is provided that hereafter the Secretary of the Navy may authorize the senior officer present, or other commanding officer, on a foreign station to order boards of medical examiners, examining boards, and retiring boards for the examination of such candidates for appointment, promotion, and retirement in the navy and marine corps as may be serving in such officer's command and may be directed to appear before any such board.

The act authorizing officers of the navy and marine corps to administer oaths is amended to read as follows:

"That judges advocate of naval general courts-martial and course of inquiry, and all commanders-in-chief of naval squadrons, commandants of

navy yards and stations, officers commanding vessels of the navy, and recruiting officers of the navy, and the adjutant and inspector, assistants adjutant and inspector, commanding officers, recruiting officers of the marine corps, and such other officers of the regular navy and marine corps, of the naval reserve force, of the marine corps reserve, and of national naval volunteers as may be hereafter designated by the Secretary of the Navy, be, and they are hereby, authorized to administer oaths for the purposes of the administration of naval justice and for other purposes of naval administration."

It is provided that Section 44 of the act entitled: "An act to codify, revise, and amend the penal laws of the United States," approved March 4, 1909, be amended to read as follows:

"Section 44. Whoever shall wilfully trespass upon, injure, or destroy any of the works or property or material of any submarine mine or torpedo or fortification or harbor-defence system owned or constructed or in process of construction by the United States, or shall wilfully interfere with the operation or use of any such submarine mine, torpedo, fortification, or harbor defence system, or shall knowingly, wilfully, or wantonly violate any duly authorized and promulgated order or regulation of the President governing persons or vessels within the limits of defensive sea areas, which defensive sea areas are hereby authorized to be established by order of the President from time to time as may be necessary, in his discretion, for purposes of national defence, shall be punished on conviction thereof in a district or circuit court of appeals of the United States for the district or circuit in which the offence is committed or into which the offender is first brought, by a fine of not more than $5000, or by imprisonment for a term not exceeding five years, or by both, in the discretion of the court."

Four items recommended by the Senate were eliminated—$750,000 for enlarging the Charleston dry dock, laundry building at Mare Island, additional navy yard on San Francisco Bay, and $30,000 for test of Talbott boiler.

The amount appropriated for the completion of the projectile plant was increased to $2,080,956. The Senate amendment for the increase of submarines for the navy provided for 40 coast submarines and 10 fleet submarines. This was changed to 20 coast submarines of 800 tons displacement the cost not to exceed $1,300,000 each.

The principal appropriations carried in the bill are as follows:

Investigation of fuel oil, $60,000.

Aviation, $5,133,000. The sum of $1,000,000 is appropriated to secure by purchase, condemnation, or otherwise the basic patent or patents necessary to the manufacture and development of aircraft.

Recruiting, $419,228.84.

Gunnery and engineering exercises, $205,000.

Outfits on first enlistment, $2,385,920.

Maintenance of naval auxiliaries, $1,144,390; instruments and supplies, $450,000.

Repair of the U. S. S. *Topeka*, $85,500.

Naval training station, California, $92,000; naval training station, Rhode Island, $100,000; naval training station, Great Lakes, $96,400, and St. Helena, $30,000.

Naval War College, $38,850.

Ordnance and ordnance stores, $8,488,333; purchase and manufacture of smokeless powder, $1,800,000; naval gun factory, $2,500,736; projectile plant, $2,080,956; new batteries, $2,201,000; batteries for merchant auxiliaries, $6,381,174 (immediately available, $4,731,174); ammunition for merchant auxiliaries, $7,731,941; anti-aircraft guns and ammunition, $3,800,000; ammunition for ships of the navy, $3,500,000; torpedoes and appliances, $1,049,280; reserve ordnance supplies, $4,657,460; torpedo station, Newport, $100,000; new machinery and tools for torpedo factory, $100,000; submarine base at New London, $1,250,000; and experiments, $100,000.

Yards and docks, maintenance, $2,709,000, and contingent, $75,000; public works, $16,976,255.01.

The Secretary of the Navy is authorized to enter into a contract for the use of the dry dock at Boston at a compensation of $50,000 per annum for a period of six years similar to the contract entered into with the owners of the dock under construction at Hunters Point, San Francisco Bay.

Medical department, $1,121,740; contingent, $291,080, and transportation of remains, $32,658.

Pay of officers, $15,333,156.42; officers on the retired list, $2,940,368.72; commutation for officers on shore, $675,679, and also members of nurse corps (female), $1,000; hire of quarters for officers where no public quarters are available, $4,000; pay of enlisted men, $26,835,914.67; on retired list, $492,657.34; extra pay to men reenlisting, $1,400,000; provisions, $10,144,943.40; clothing and small stores fund, $1,500,000; reserve material, $3,000,000; maintenance, $3,250,000; freight, $850,000; fuel and transportation, $6,500,000.

Construction and repair of vessels, $12,850,000, and improvement of construction plants, $200,000.

Bureau of steam engineering, $12,270,000; high power radio stations at Porto Rico, $400,000; engineering experiment station, $85,000; equipment of building, $20,000; and machinery plants, $190,000.

Naval Academy, exclusive of public works, $909,049.20. The sum of $75,000 of this appropriation is to be used for equipping the marine barracks at Annapolis as temporary quarters for housing and messing midshipmen.

Marine Corps: Pay of officers, $1,690,666; officers on the retired list, $198,307.50; enlisted men, $4,800,532; for retired enlisted men, $175,986; undrawn clothing, $100,000; mileage, $58,000; commutation of quarters of officers on duty without troops, $75,000; provisions, $1,676,000; clothing, $1,580,000; fuel, $260,000; military stores, $852,000; camps of instruction, $31,000; transportation and recruiting, $500,000; repairs of barracks, $220,000; forage, $68,000; commutation of quarters for enlisted men, $167,000; contingent, $846,385; and for authorized expenses of the Marine Corps reserve, $25,000.

SHIP CONTRACTS LET.—It is announced that shipbuilding contracts have been awarded as follows:

Battle Cruisers.—2 to Newport News Shipbuilding and Dry Dock Co.
1 to Fore River Shipbuilding Corporation.
1 to New York Shipbuilding Co.

These contracts were awarded on a basis of cost plus 10% profit, and it is stated that the Navy Department hopes for delivery in about three years.

Scout Cruisers.—1 to Seattle Construction Co.
2 to Cramp's.
2 to Union Iron Works.

Delivery in from 30 to 32 months is provided for, the contract prices ranging from $5,950,000 to $5,996,000.

AIRCRAFT CONTRACTS LET.—Purchase of 16 non-rigid dirigible airships for coast and harbor patrol work, at a total cost of $649,250, was announced March 12 by the Navy Department.

The Curtiss Aeroplane Company, of Buffalo, N. Y., will build three for $122,250; the Connecticut Aircraft Company, New Haven, two for $84,000; the Goodyear Tire and Rubber Company, Akron, Ohio, nine for $360,000, and the B. F. Goodrich Company, of Akron, two for $83,000. Deliveries will begin in 120 days.

The airships are the first of such type to be bought by the navy under the recent $5,000,000 appropriation for aeronautics. They will be 160 feet in length, 31½ feet in diameter, or 50 feet high over all; will be equipped with radio communication and 100 horsepower motors capable of making a continuous flight of 16 hours at 35 miles each and a maximum speed of 45 miles an hour for 10 hours.

Under the designs drafted by naval constructors the dirgibles will be able to operate from shore bases and alight on water surface in good weather.—*New York Herald.*

LIMITATION ON SIZE OF BATTLESHIPS.—In reply to a clause in the Naval Appropriation Act of August 29, 1916, directing the Secretary of the Navy to submit to Congress a report on the largest battleship which can be undertaken in the United States and other particulars concerning such a vessel, Mr. Daniels has made a report on the limitation on the size of battleships that is dated February 14. After discussing the dimensions of the locks of the Panama Canal as the chief factors in this problem, together with the depth of draft in connection with our harbors, Mr. Daniels makes the following statements:

"Within the limitations of over-all dimensions, as arrived at under the above considerations, an indefinite number of designs could, of course, be developed, such designs differing in the importance attached to the maximum development of one or more of the chief military characteristics for a battleship. The technical and military advisers of the department have prepared and considered a number of alternative designs, from which the one described below has been selected as embodying such a combination of military characteristics as produce a vessel of the maximum military value possible in the present state of the shipbuilding and engineering sciences and arts, within the limitations set forth above. The principal dimensions and characteristics of this vessel are as follows: Displacement, 80,000 tons; length, 975 feet; beam, 108 feet; full load draft, 34 feet; main battery, fifteen 18-inch guns in five triple turrets; secondary battery, twenty-one 6-inch guns, four 21-inch torpedo-tubes; protection, main armor 16 inches, under water the most complete and efficient system available at the present date; speed, 25 knots; radius of action, 12,000 miles at cruising speed; cost, $50,000,000 in round figures.

"In regard to the desirability of building one or more such vessels, there can, of course, be no question that, ship for ship, such vessels would be of greater military value than battleships of the present size. A single such vessel, however, would not be of great value to the United States Navy, as it would not be suited to act in unison with the other major units of our fleet. To develop the value of such a vessel it would be necessary to lay down not less than five in order to give an independent division of this type with an allowance for one in reserve or under repair. This would require an outlay of $250,000,000.

"In considering the advisability of such a long step in the development of naval types there must be considered the great relative decrease in value of all United States naval vessels already built, building, and authorized. This would occur despite the fact that our present vessels include the largest and most powerful battleships extant. When the dreadnoughts were commissioned in the British Navy, the effect was to establish a new basis for measurement of naval power, all previous capital ships becoming of minor military value, and being considered to contribute to the naval strength of any power in only a secondary degree. The building of vessels such as contemplated above would probably result in a similar readjustment, including radical readjustment in sizes and numbers of other types of vessels required to operate with or against first-line battleships.

"The three-year program, as authorized in the naval appropriation act of August 29, 1916, represents, with only minor modifications to date, the best considered judgment of the department in regard to numbers

and types of vessel best fitted to increase the fighting efficiency of the United States Navy as now constituted. No information has yet transpired as to the events in the course of the present European war which can be considered as enabling a final and decisive answer to be made to the various questions which confront the responsible military and technical officers of all navies. This fact makes the development of any new type of naval vessel subject to review and modification as the result of further developments in the course of the war. A careful review of the entire situation, including the above considerations, has led the department, upon the recommendation of the general board of the navy, to the opinion that at the present stage a wide departure from accepted types, such as is contemplated by the above-quoted clause of the Naval Appropriation Act of August 29, 1916, is not necessary nor desirable."—*Army and Navy Journal.*

FACILITIES FOR BUILDING SUBMARINE CHASERS.—As an indication of the capacity of American small boatbuilding yards the *New York Times* says that the Elco Company constructed 550 motor-boats for the British Admiralty in less than 550 days, the output reaching three a day when the work had been standardized. The characteristics of the Elco boat are given as: displacement 32 tons, length 80 feet, beam 12½ feet, draft 4½ feet, two 250-h. p. motors, speed 19 knots, radius 650 miles, fuel capacity 2200 gallons of gasoline, cost $40,000. The armament is not stated.

EFFICIENCY OF SUBMARINE CHASERS.—The *New York Times* prints the following criticism of British motor-boats, which apparently refers in part to the Elco boats described above:

"Thomas Orchard Lisle, authority on motor-driven craft, and associate member of the Institute of Marine Engineers of Great Britain, the British equivalent of the American Society of Naval Architects and Marine Engineers, said that the German submarine operations in British waters had shown that motor-boats of less than 100 feet in length were of little value as submarine chasers. Mr. Lisle has kept in close touch with England's problem, in so far as that problem has to do with the employment of motor-boat chasers, hundreds of which have been constructed in this country for the Admiralty.

"'From such information that I have been allowed to obtain without infringing upon naval secrets, concerning the operations of motor-boat submarine chasers of Great Britain, also of the operations of the dozens of the motor-yachts and motor-boats now used around the coast of England for various purposes, it appears,' said Mr. Lisle, 'that boats of under 100 feet in length are little use for other than inshore and actual harbor work, in which, of course there are innumerable valuable and important duties, which small craft can efficiently undertake.

"'Submarines operate at distances from between 20 and 200 miles off shore, and furthermore, often operate in the heaviest weather, under which conditions boats of under 100-foot length would be of little value.

"'For the actual work of scouting and chasing submarines at sea, what are most needed are fast boats of from 100 to 150 feet in length, fitted with internal-combustion engines, preferably of heavy-oil type. Seaworthiness is of more importance than speed, and a speed of between 18 and 20 knots is quite sufficient. It must be borne in mind that in order to form an effective submarine patrol these boats may have to stay out 100 miles at sea in storm and calm from one to three weeks at a time for month after month with only brief intervals in port. At a meeting of yachting men the other afternoon Franklin D. Roosevelt, Assistant Secretary of

the Navy, stated that, generally speaking, motor-yachts of under 40 feet would not be of any use, and that large boats would be required for distances up to 400 miles off shore.

"'A friend of mine is a sub-lieutenant in charge of one of the 86-foot motor launches, which were shipped from this country to England by the Elco Company of Bayonne, and he points out that small boats have a number of disadvantages, particularly in heavy weather, as not only do they lose their speed, but they are very wet, and have frequently to put in for repairs; also the officers and crew require longer periods of rest to recover from the severe exposure, and he says that if there is any error it should be on the larger size.

"'This sub-lieutenant previously was a naval architect, and had considerable experience with motor craft, and the size of vessel which he considers the smallest capable of carrying out a fairly effective submarine patrol service is a boat of 100 feet in length, driven by two high-speed heavy oil engines of 300 b. h. p. each, which would give a speed of about 20 knots. Such boats would be capable of cruising a considerable distance out to sea and staying for long periods without the crew suffering too much from exposure.

"'It must be remembered that in the event of war this submarine patrol may have to be carried on for several years, and such boats that are built now should be strong enough to withstand at least from one to two years' constant work at sea.

"'Personally I think that every encouragement should be given to yachtsmen to train with the fleet; but I believe the uses of their boats, except in the case of large craft, will be limited to patrolling fairly sheltered waters, or inland navigation.

"'Any submarine-chasing craft built by the Navy Department should not be less than 100 feet in length, and I am positive that the two boats now building for the United States Navy, which are about 45 and 60 feet in length respectively, will be found to be totally inadequate for the purpose of chasing submarines in the open sea, as it is hardly likely that submarines of an enemy will operate close in shore; but rather will attack our merchant fleet 50 to 300 miles out at sea. They will have their uses, of course, but it will not be chasing submarines.

"'I was told last week by the captain of a British ship, who has seen many of the 550 patrol motor-boats built in this country at work along the British Coast, that it has been necessary to remove the guns from these boats, and it would be interesting to know if such is actually the case. It would account for the success of the present German submarine campaign.

"'The first submarine-chasing motor-boat ever built was the *Mercury II*, a 60-footer, built 12 years ago, (1905) by Yarrows, Ltd., for the British Government. Her gasoline engines total 300 b. h. p., and on the official naval trials drove her at 26 knots. Exactly what she was built for was never made clear, but after a period of inaction she was attached in 1912 to the submarine flotilla, and was used in maneuvers.

"'At that time the Admiralty prepared a very extensive scheme for the use of motor-boats, but in the usual official style the project was pigeonholed. When the war broke out the documents were unearthed, the red tape cut, and the present Royal Volunteer Naval Reserve established, to which hundreds of British power yachtsmen belong, and are giving most valuable service to their country by policing home waters.'

"'The United States,' Mr. Lisle said, 'should immediately begin the construction of hundreds of motor-boat submarine chasers and should build them big enough and seaworthy enough to make them effective in the event of a submarine raid on merchant shipping in Western Atlantic waters.'"

DRY DOCKS IN THE UNITED STATES.—The *Army and Navy Journal* gives the following statistics in regard to American dry docks:

Location of Government docks	Maximum ship data		Draft, mean high water		Maximum ship	Date of completion	Cost
	Length	Beam	Regular	Emergency			
Graving docks	*Ft. In.*	*Ft. In.*	*Ft. In.*	*Ft. In.*			
Panama, Canal Zone, No. 1	1,034 0	110 0	34 6	36 0	Battle cruiser..	1916	.....
Norfolk, No. 4.....	1,012 0	118 0	39 9	.....	" " ..	1919[1]	$3,500,000.00[2]
Philadelphia, No. 3 ...	1,012 0	118 0	39 5	.....	" " ..	1919[1]	3,500,000.00[3]
Pearl Harbor, No. 1...	990 0	113 4	31 8	.....	" " ..	1918[1]	4,442,115.43[3]
Puget Sound, No. 2...	801 0	113 1 110 0	35 0	36 6	Washington[4] ..	1914	2,300,000.00
Philadelphia, No. 2 ...	720 0	89 6 91 8	29 5 28 5	29 4	North Dakota.. Utah	1908	1,471,550.67
Portsmouth, No. 2	720 0	88 6 91 10	29 9 28 3	29 8	" ..... Wyoming	1905	1,134,995.30
Boston, No. 2.....	719 0	89 2 92 2	29 6 28 0	29 6	Utah	1905	1,100,000.00
Mare Island, No. 2....	719 0	92 3 88 2	28 3	29 9	North Dakota.. Utah	1910	1,556,878.01
Norfolk, No. 3	713 0	101 10 101 4	30 7	31 0	Washington[4]...	1908	1,199,583.85[5]
New York, No. 4.....	682 0	110 6 110 0	32 5	33 11	" ...	1912	2,745,454.29
New York, No. 3.....	612 0	72 4	26 9	.....	Minnesota.....	1897	554,707.08
Puget Sound, No. 1...	602 0	74 6	27 5	.....	South Carolina. Minnesota.....	1896	632,636.33
Charleston, No. 1.....	545 0	101 0 98 0	30 7	31 7	South Carolina. Utah	1908	1,249,997.90
Norfolk, No. 2.....	460 0	59 2	24 0	.....	Minneapolis.... Brooklyn.....	1889	504,980.76
Mare Island, No. 1....	455 0	56 4	24 9	.....	Charleston..... Brooklyn.....	1891	2,772,332.08
Philadelphia, No. 1...	451 0	60 4	22 5	23 4	Minneapolis.... Charleston.....	1891	548,700.00
New York, No. 2.....	421 8	74 6	23 5	.....	Missouri	1890	595,019.24[6] 596,802.52[6]
Boston, No. 1.....	359 0	53 8	19 3	.....	Chicago ..... Amphitrite.....	1883	972,717.29
New York, No. 1.....	320 0	51 2	20 11	.....	Monterey	1851	2,003,498.05
Norfolk, No. 1.....	300 0	52 0	20 2	.....	Cheyenne ..... Amphitrite.....	1834	943,676.00
Floating docks							
New Orleans.....	456 0	76 10	24 6	.....	Vermont	1902	800,712.52
Olongapo.....	518 0	85 2	26 11	.....	North Dakota..	1905	1,170,807.93
Private, state and municipal docks							
Massachusetts State (Boston)	1,160 0	118 0	42 3	44 3	Battle cruiser..	1918[1]	3,231,000.00[7]
Hunters Point	990 0	108 0 110 0	38 0 36 0	39 6	" " ..	1918[1]	(8)
Newport News, No. 2.	795 0	83 0	29 6	29 6	.....	.....	.....

[1] Estimated date of completion.
[2] Contracts awarded; work under way.
[3] Authorized and plans completed.
[4] Contract let.
[5] Extended, 1911, at cost of $561,891.94.
[6] Cost of rebuilding in 1901.
[7] Building cost estimated.
[8] Building.

NOTE.—Maximum length of ship is taken, giving five feet clearance from dock and caisson at bow and stern of ship. The emergency draft is that which gives six inches clearance over the sill or six inches clearance over a blocking depth of three feet. Philadelphia, No. 3, and Norfolk, No. 4, cost given is amount appropriated.

COMMENTS ON THE BATTLE CRUISER DESIGNS.—The publication of Admiral Griffin's statement of reasons for adopting electric drive for battle cruisers, which was reproduced in the February number of the PROCEEDINGS, was the occasion for much comment; examples of which are quoted below:

The *Scientific American* published the two letters that follow:

"'To the Editor of the *Scientific American:*

"'I have your letter of the 1st inst., enclosing a copy of a letter from Mr. Charles G. Curtis in regard to the machinery installation for the battle cruisers, and thank you for the opportunity offered to make reply thereto.

"'The subject has been very fully covered in my letter of January 5, 1917, to the chairman of the Naval Affairs Committee of the House of Representatives commenting on a similar letter from Mr. S. S. Wheeler; and I do not think that further comment from me is necessary, beyond correcting a few misstatements that were not included in Mr. Wheeler's letter.

"'Mr. Curtis says that Mr. Lovekin stated in a letter to the secretary that the total weight "of the ship" would be over 1000 tons more with the electric than with geared drive. Mr. Lovekin did not make such a statement: He said that the weight "of the geared outfit" would be over 1000 tons less than that of the electric drive. He also said that it would be necessary to add "about 290 tons of extra armor" in the ship with the geared drive. There are other important matters that enter into the weight *of the ship*. One of these is the fuel necessary to give a certain radius of action. The fuel consumption guaranteed by the Fore River Company at 10 knots is 11.5 per cent greater with geared drive than with electric drive. This means that, in order to obtain the radius of action contemplated in the design, the ship with geared drive would have to carry 589 tons more fuel than the one with electric drive. The weight *of the ship* as affected by machinery and fuel will stand thus:

	Tons	Tons
Electric drive heavier than geared	...	1,000
Additional armor with geared drive	290	....
Additional fuel with geared drive	589	....
Total additional weight on account of geared drive		879
Difference, in favor of geared drive		121

"'Accepting Mr. Lovekin's weight as correct, the difference in weight *of the ship* is, therefore, 121 tons in favor of the geared drive; but this figure for weight of machinery is far in excess of the actual weight, and no account has been taken of the additional hull weight that will be necessary on account of the rearrangement necessary with geared drive. When these are given proper consideration, the resulting *weight of ship* will be much less for the one with electric drive than for that with geared drive.

"'Mr. Curtis seems to think that because electric drive is used in one type of ship, we should, to be consistent, use it in all. I had supposed that he was a better engineer than that.

"'His statement that the engineers of the Bureau of Steam Engineering thought the electric drive would be lighter than geared drive has no foundation in fact. Had we thought so, we should not have used geared drive in the scouts and destroyers.

"'As to stealing a march on foreign navies, we have long since been forced to the conclusion that it is practically impossible to keep secret any of our undertakings; and experience with the design of the battle cruisers has shown conclusively that some of the American engineers and shipbuilders to whom the plans were sent in confidence are unworthy of the trust that was reposed in them, and that, despite their protestations of patriotism, they may be depended upon to keep foreign governments fully informed regarding our designs.

"Only two of the 22 members of the Naval Consulting Board have written the secretary in the matter; others to whom the propagandists appealed refused to write; and Prof. Webster has openly opposed Mr. Curtis' propaganda.

"'Nine people (not all engineers), including Mr. Curtis, have written to the secretary, all asking that the design of machinery be referred "to an impartial board of competent experts." None of them suggested how this board was to be selected.

"'If the shipbuilders have told Mr. Curtis that as good underwater protection of the ship can be obtained with geared drive as with electric drive, as he states, their vision must be warped. It is doubted that Mr. Curtis speaks for the shipbuilders as a whole, or for all of them. Only two bid on the battle cruisers (the Union Iron Works being, in fact, a Fore River bid) and it is generally understood at the Navy Department that the Newport News Company would not put geared drive in these ships if they could. It may be stated without qualification, that the chief engineer of that company—one of the most successful designers of marine engines in this or any other country—is unalterably opposed to geared drive for them.

"'The concluding paragraph of Mr. Curtis's letter is evidently an appeal to those whom the propaganda has not reached, to urge Congress to delay the construction of these ships. Such appeals were made to the Naval Committee of the House, but the unwillingness of that committee to act may undoubtedly be taken as an evidence on their part to interfere in the design of ships, however much interested parties outside the navy, under the guise of patriotic appeals, may potest because their royalties are endangered.

"In conclusion, I should like to quote a portion of a paragraph from Prof. Webster's letter to which reference has been made. Others have said practically the same thing, but none has expressed it quite so well. Here it is:

"'"If you desire to extract the milk from this cocoanut, consider this: The General Electric Company bought from Mr. Curtis the rights for the manufacture of the turbine, except for marine turbine, which was bought by the Fore River Company. Now, curiously enough, if a turbine drives a screw propeller directly or through gearing, it is a marine turbine, but if it drives a dynamo it is not. Consequently with the electric drive, the Fore River Company cannot build the turbines, although it has all the equipment for building them. The turbo-generator, including engines and dynamos, must be built by the General Electric. Does this explain why the Fore River Company 'showed' the secretary something 'equally as good?'"

"'I have submitted this for the perusal of the Secretary of the Navy, who authorizes me to say that he does not care to discuss Mr. Curtis' letter.

"'R. S. GRIFFIN,
"'Engineer-in-Chief, U. S. Navy.

"'Navy Department,
"'Bureau of Steam Engineering,
"'Washington, D. C.
"'Feb. 5, 1917.'"

"'To the Editor of the *Scientific American:*

"'I beg to reply to Admiral Griffin's letter, date February 5, published in this issue of your paper as follows:

"'His statements and the figures he gives regarding the saving in weight and the extra armor based on Mr. Lovekin's letter do not correctly represent the facts at all and are of no real value in arriving at the truth in this important matter. He includes in his calculations on the Fore River design 290 tons of additional armor; whereas this company has already stated definitely that there is practically no additional armor required and

what difference there is is negligible. This fact has already been brought to the attention of Admiral Griffin in the reply by Mr. Wheeler to his letter of January 5, but he continues to ignore it.

"'The facts in regard to Mr. Lovekin's letter and his design of battle cruiser with geared turbines are as follows: When Admiral Griffin's letter of January 5 appeared I asked Mr. Lovekin, who is the chief engineer of the New York Shipbuilding Company, for a confirmation of the facts stated in his letter and he replied that in the original geared drive arrangement worked out by his company there was, as stated in his letter to the secretary, 290 tons of extra armor required, but the difference in weight between the electric machinery and the geared turbine machinery was considerably over 1000 tons so that he made the net saving to be something in the neighborhood of 1000 tons. But he informed me that he had since modified the original design so that no extra armor will be required and that he was willing to state without qualification that at least 1000 tons of the total weight of the ship should be saved after all details and changes have been taken into account. Also that this saving in weight would be accompanied by a saving in cost of at least $1,300,000.

"'Admiral Griffin says that the Fore River Company design required 11.5 per cent more fuel than the electric drive to cover a given radius of action at 10 knots speed. He does not, however, state what the Fore River Company, in a letter attached to its bid, stated viz.:

"'"By the introduction of cruising units, not shown on this company's design because of lack of time, equally good economies can be obtained at the lowest speed to those obtained by the electric drive."

"'He failed also to state that the plans and estimates made by Mr. Lovekin which were filed with the Department which involved geared turbines other than the Curtis type showed that the geared drive is 5 per cent more economical than the electric at this 10-knot speed. If Admiral Griffin should apply his reasoning to this case he would arrive at the conclusion that in Mr. Lovekin's design of geared drive there would be a saving of 165 tons of fuel to cover a given cruising radius so that the net saving in the weight of the ship would be 1000 tons + 165 tons = 1165 tons.

"'Mr. Lovekin's company having contracted for two battleships was not in a position to build a battle cruiser at this time and so did not bid officially. Mr. Lovekin, however, unofficially submitted his plans and estimates to the Bureau of Steam Engineering and wrote a letter to the Secretary strongly advising against the adoption of the electric drive on the battle cruisers and pointing out the great saving in weight and other advantages of the geared drive. In this letter he said:

"'"I feel that I will be neglecting my duty as a citizen if I did not inform the Honorable, the Secretary of the Navy."

"'After further consideration and investigation the Fore River Company expresses itself as entirely confident of being able to save at least 1000 tons in weight and $1,300,000 in cost, and also to place all the boilers below the protective deck by the substitution of the geared drive for the electric.

"'In regard to Admiral Griffin's statement that the chief engineer of the Newport News Company is unalterably opposed to the geared drive in the battle cruisers I will say that the president of this company told me that in a conference between the secretary and the shipbuilders immediately before the battleships were awarded, he argued as strongly as he could against the adoption of the electric drive because of its experimental character and because of its additional weight and cost, and that they favored the geared drive. His company put in bids with both forms of drive, but Admiral Griffin himself recommended the *acceptance of the bids involving the geared drive.* Admiral Griffin does not deny this. Immediately before the battle cruiser bids were opened the chief engineer of the Newport News Company and its president both expressed to me the view that it

was folly to put the electric drive in these large battle cruisers, and that it would involve an immense increase of weight, cost and other disadvantages.

"'I hardly feel called upon to reply to Admiral Griffin's slurring reference to the disclosure to foreign governments by American engineers of the plans for these battle cruisers. I, myself, am not aware of any such disclosure. His own statement, however, shows that it could do no harm. My experience is that foreign governments show no interest whatever in what we are doing in these matters. I cannot, however, repress my surprise that the admiral should thus by innuendo and without naming the offenders cast discredit generally on American engineers and shipbuilders.

"'Replying to Admiral Griffin's intimation that the "milk of the cocoanut" in the opposition now widely aroused by the "electric drive" is my interest in royalties from turbines, I beg to state that my efforts to set the Navy Department right in this important engineering and military matter are not due to any royalty or commercial considerations. Such considerations would never have impelled me to undertake the task. The antagonism these efforts were likely to arouse would more than outweigh the advantage from any royalties that might result. Moreover it is quite as likely that other types of geared turbines will be adopted in these ships.

"'CHARLES G. CURTIS.

"'New York City.
"'February 7, 1917.'"

Commenting editorially on the designs, the editor of the *Scientific American* says:

"In an illustrated article on the new battle cruisers, which we published on December 16, 1916, there occurs the following sentence: 'We shall see in these ships the novelty of the boiler-and-engine plant being located upon two decks.' Having in mind the fact that it was a cardinal principle of warship design to place the whole of the main motive power below the protective deck, and therefore below the water-line, we were puzzled at the time to understand how sufficient vertical height could be found to accommodate two tiers of boilers upon two decks below the protective deck; but we concluded that the Bureaus of Steam Engineering and of Construction and Repair had found some way to do this. At the time of the opening of the bids, however, we learned, to our profound amazement, that one-half of the boiler plant was to be placed *above the water-line, where it would be exposed to destruction by the 11-, 12- and 15-inch shells, with which alone modern engagements between capital ships are fought.*

"A study of the wash drawing of these ships, prepared by the Navy Department for the press of the country, shows, it is true, that there is a belt of side armor in the wake of the deck upon which these boilers have been placed; but it takes only an elementary knowledge of warship design to make it evident that in a ship of only 35,000 tons displacement, after provision has been made for the enormous weights involved in a motive power plant of 180,000 horsepower and for a battery of ten 50-caliber 14-inch guns with their heavy barbettes and turrets, there cannot be very much displacement left for side armor; and if it has been possible to carry a belt of say four to six-inch armor throughout some 500 feet of the length of these ships the designers have done very well indeed.

"Now it has been well established in the present war that any such light armor as this, when opposed to shells of 11- to 15-inch caliber, serves no better purpose than to act as a shell-burster. In the battle of Jutland the 7- and 9-inch armor of the British battle cruisers was impotent against the 11- and 12-inch shells of the Germans, and three ships were sunk by gun-fire. Calibers are constantly increasing, and our new battle cruisers, should they ever be lined up for a fight, would be the target for shells of 15-, 16- and even 18-inch caliber. Against such projectiles their necessarily

light armor would be as impotent as the mere shell plating of the ship itself. Indeed, we have it on direct and highly reliable authority that the British have just completed a class of battle cruisers in which they have discarded side armor altogether, realizing that it is better to let the shells pass clear through the ship than make sure of their detonating as they pass through light armor that is insufficient to stop them.

"Basing our conviction on what has been said above, we feel justified in our belief that the placing of one-half of the boiler plant of these great ships above the water-line exposes it to the risk of being put entirely out of commission by the first successful salvo of the enemy.

"Throughout the 50 years of the development of steel warships construction it has been a fundamental principle, which we believe has never until now been violated, that the vitals of the ship (engines, boilers, magazines and steering gear) should be placed below the water-line. Water affords better protection than the thickest armor; for the shells that strike the water before they reach the ship are deflected upwards, and either pass over her altogether or enter the ship above the water-line.

"If this grave defect in the battle cruisers were irremediable, we would say let the designs go through, let the ships run the risk of losing half their boiler power and six or seven knots of their speed. But the defect is not irremediable; for it is well known, both to the Bureau of Steam Engineering of our navy and to the engineers of our great shipbuilding companies that by the substitution of the geared drive for the electric drive, it is possible to develop the 180,000 horsepower required without placing a single one of the 24 boilers, or any part of the engines, above the protective deck.

"The Navy Department experts are committed to the electric drive. They wish to employ it, even at the risk of having half the motive power of the ship put out of commission early in an engagement. The private shipbuilders, on the other hand, believe that the geared drive, which is being used on every one of the great fleet of battleships and battle cruisers which the British have built since the beginning of the war, will give better service in operation, with the added advantages that the power plant will be safe against shell-fire, and that there will be a saving on each ship of 1000 tons of weight, and a saving in cost on the six battle cruisers of $7,500,000.

"In view of the existing dilemma, and of the fact that upon the behavior of these great ships may depend some day the issues of victory or defeat for the United States Navy, we respectfully suggest to the Secretary of the Navy that he submit this question to the Naval Consulting Board or to an independent board of naval architects and naval engineers selected by the Naval Consulting Board. In doing so he will be backed up by precedents, such as the case of the decision as to whether the United States should build a canal at Nicaragua or Panama, and again on the question of whether that canal should be high-level or sea-level. The two Panama Canal boards passed on an expenditure of $400,000,000; and a like sum of $400,000,000 is involved in the 16 capital ships of the three-year program that are affected by this question of electric versus geared drive.

"But, above all, there may be involved in this matter the fate of the nation."

Nikola Tesla, who was active in the development of the induction motor for commercial use, made the following statement in the *New York Herald:*

"The perfection of the modern high-speed gear was a veritable *tour de force* of the scentific machinist. It is a wonderful device, but it has its inseparable weaknesses and shortcomings. Since the friction loss in it is sensibly constant through a wide range of performance, a relatively great amount of energy is absorbed at small load. The gear is likewise

very sensitive to shocks and vibrations, which break down the capillary oil film, vital to smooth running. In consequence, there is great waste of power when the resisting force is subject to frequent and sudden fluctuations. Measurements I made with turbine gears have shown that while the efficiency with steady and normal effort was 96 per cent, not more than 90 per cent was realized with a rapidly varying load. This is what might be expected in practice. Any one who has listened to the tortured engines of a steamship in heavy sea could not have failed to observe how the turning effort varies as the vessel rolls, pitches and ploughs through billows and conflicting undercurrents. A similar state of things is apt to confront a warship in action, as was evidenced in recent naval engagements, when mountains of water were raised by the exploding shells. Under such circumstances the gear is at a great disadvantage, as the electric drive is susceptible to these drawbacks in a much smaller degree. The idea that the gear transmits more of the primary power to the propeller than the combination of dynamo and motor is, therefore, largely illusionary. There is ample evidence, experimental and inferential that rather the opposite is true.

"Considering the efficiency of the screw as distinct from that attained in the transmission of power, it is admittedly better with the electric drive, this conclusion being entirely based on the superior adaptability and flexibility of the system. But there are deeper causes which should be taken into account. The interposition of electromagnetic means between the turbine and propeller materially reduces the loss due to shocks, vibrations, racing and other disturbances owing to inherent elastic resilience and equalizing tendency. The saving of energy thus effected at high-speed and in a heavy sea is considerable.

"Economy in cruising is one of the most desirable qualities of a war vessel. This is its ordinary use, for the chance of ever being engaged in battle is remote. The bitterest opponents of the electric drive do not deny that it excels in this feature, upon which the manufacturer chiefly relies in guaranteeing a fuel consumption from 10 to 12 per cent smaller than with the gear. The latter is hopelessly condemned by inability of adjustment to varying speed and wasteful in cruising operations, while the former is readily adaptable and economical under all conditions.

"Another quality of the electric drive which may prove especially valuable in action, is its capacity of carrying great overload without danger, owing to the nature of the connection between the turbine and propeller, as explained. The gear is rigid and unyielding and any increase of effort, particularly if sudden, may cause a breakdown.

"Referring to the auxiliaries proper and other apparatus for ship use to which are chargeable approximately 20 per cent of the fuel consumed, a very substantial saving of power will be achieved through the introduction of the electrical method.

"Quite apart from this central station supply will be operative in reducing other waste, many accessories will be dispensed with and general economy materially increased.

"But from the military point of view the quickness, ease and precision of control will perhaps be the most significant of the advantages gained. Everything may be made to respond instantly to the pressure of a button. By reversing the motors the vessel may be brought from full speed to a stop within its length. It will be possible to make it go through all evolutions with extraordinary rapidity and a perfection of maneuver, undreamed of before, will be attained.

"A curious mistake is made by the advocates of the turbine gear in estimating relative weight. It hardly needs be stated that it is unfair, if not absurd, to compare arrangements of widely different character and scope. Only such as are capable of accomplishing the same results should be considered. Now, a gear drive corresponding to the electric would consist of four main turbines with gears, four reversing turbines of the same

capacity, and eight smaller driving and reversing turbines for cruising. The agglomeration of complex and not all too rugged machinery, with its network of water, air and oil pipes, valves, pumps and attachments, would by far exceed in weight the proposed electric drive, and would also require better structural protection, not to speak of other defects and shortcomings.

"It should be observed, however, that the weights must be taken in their relation to that of the ship. One equipment may be heavier than another, but if it is more efficient and thereby reduces the weight of fuel and other cargo, it is for all purposes the lighter of the two.

"The same is true of the cost. Comparative figures mean nothing. The question is whether the investment of capital is justified by what is to be accomplished. But enough has been said to show that for results in all respects equivalent, assuming them to be possible, the gear type, notwithstanding all claims to the contrary would be more expensive.

"That the electric drive is experimental and uncertain of performance is the least tenable of adverse assertions. In the first place, it has been successfully employed on a number of vessels and a great many more are being built. It also was found to be capable of an efficiency higher than that of any other form. But this is quite immaterial. The confidence that in the present instance all expectations will be realized is not based on a few demonstrations, but on years of experience with newer plants ever since my system was commercially inaugurated. Tens of millions of horsepower of induction motors are now in use the world over and no failure is recorded.

"The new cruisers will require 180,000 horsepower each, which, if necessary can be developed by four units of 45,000 horsepower. Turbines of that capacity have been constructed and are in operation to-day. Dynamos of corresponding output have been installed at several places and are supplying light and power to large cities and districts. Induction motors of 15,000 horsepower are being turned out by the manufacturers and can be produced in any size that may be desired, for of all kinds of motors this is the simplest and most dependable. Long since the whole system has been worked out and perfected to the least detail. The project is colossal, but it can be readily carried out by any of the new concerns who are possessed of the proper facilities. Not even a new tool has to be made. There is nothing whatever untried or hazardous about the electric drive.

"Much stress is laid on reports, still to be verified, that it was rejected by England and Germany. But this is of no consequence. It has been rejected here more than once. Besides, there was war in the air of Europe and the time for radical innovations unpropitious. Moreover, the Diesel engine was looming up with large possibilities and Dr. Föttinger's hydraulic drive was being tried. The beginning must be made somewhere and it would be deplorable indeed if the United States, where the invention was first announced and introduced on a gigantic scale, were the last to recognize it. Such mistakes have happened only too often. The foreign navies are not in the habit of keeping the press informed of their doings and it is safe to predict that if progress in this country is much retarded there will be a repetition of previous disappointments.

"It is unnecessary to dwell on other objections which are of minor importance and of no bearing on the principle. Without going into tedious technical discussion, it may be stated that the electric drive, if judiciously designed, will have not less than 25 per cent of fuel and, with due regard to this and certain specific and invaluable advantages, will be lighter, cheaper and in every respect more dependable than the gear. In fact, I believe that a scheme can be devised permitting the placing of all vital parts below the water-line. In view of this, it is to be hoped that the Secretary of the Navy will not pay attention to the protests of rivals, however patriotic, but will cause the good work to be pushed to completion with all the power at his command."

The *Army and Navy Journal* says:

"The statement of J. Bernard Walker, editor of the *Scientific American*, and also a member of the naval committee of the National Security League, that the plans for the four battle cruisers authorized in last year's naval program have a 'grave military defect' in that they call for the installation of half the boiler equipment above the main armor belt, is but the latest of a score of such criticisms which have come from civilian experts recently. While no officers of the Bureau of Construction and Repair in the Navy Department could be induced to answer Mr. Walker's statement, an explicit reply—which is 'official,' by the way—can be obtained from statements made before the Committee on Naval Affairs of the House in December last. Chief Constructor David W. Taylor, chief of the bureau, told the committee that while the plans did call for the installation of half the boilers above the protective deck, this 'is not a feature of the electric drive per se.' It did not apply, he added, in the case of plans for electrically driven battleships. In the case of the battle cruisers, he said, it was planned to protect the upper tier of boilers by 'armor and a special steel deck.' The important point was made at the same hearing that, even should the upper tier of boilers be disabled despite their special protection, the lower tier (below the protective deck) would insure the battle cruiser 'a speed of 30 knots, which is as fast as any existing battle cruiser that we have information about.'

"It can be added here that the arrangement of the boilers in the new ships was necessary, in the view of the naval constructors, in order that they might be protected from the far more serious menace of a torpedo attack. If all the boilers (there are to 24) were placed below the main protective deck, many would be crowded too near the sides of the ship, decreasing the space available for the safety compartments which are to be included in the new vessels and thus increasing appreciably the possibility of the ship's being disabled by a well-aimed topedo. In the plans adopted—which have aroused so much criticism—the boilers are divided into two distinct series, 12 in each, with an armored deck between. The all-important dynamos are in every case to be below the protective deck. As was pointed out officially before the committee, the disabling of a dynamo would mean 'the serious reduction of the fighting capacity of the ship and her steering ability.'

"Despite the continued attacks on the electric drive, there is not the least tendency in the Navy Department to change from this method of propulsion. The extreme success of the fuel ship *Jupiter* is alone enough to impel further trials of the electric drive. Speaking of the *Jupiter*, a high official of the department recently said that she was without exception 'the most satisfactory fuel ship we have afloat to-day . . . we do not know she is afloat, she causes so little trouble.'"

The *Army and Navy Register* says:

"An interesting session of the Senate Naval Committee occurred on the sudden call of its chairman, Mr. Tillman, on February 10, when Chief Constructor D. W. Taylor and Engineer-in-Chief R. S. Griffin appeared and defended the details of the designs adopted, mainly, for the new battle cruisers. This was a transfer to Congress of the fight against the adoption of the electric drive as the motive power of that type. Much has been said and written by experts outside of the Navy Department in criticism of the proposed installation of the electric drive on the battle cruisers. Members of the House and Senate naval committees have received numerous communications in emphatic protest, and Secretary Daniels and Rear Admiral Griffin have taken occasion to reply in equally positive language defending the position and policy of the Navy Department. The House Naval Committee refused to go into the question on the ground that it was an entirely technical subject with which the bureau experts of the Navy Department had exclusively to do and as something for

which they must be held responsible. The attempt to involve that committee in the controversy failed. Mr. Tillman, however, was impressed with the information which has come to him, while Senators Poindexter and Lodge appear to have been equally desirous of hearing the departmental side of the case. The complainant on Saturday was Mr. J. B. Walker, the editor of the *Scientific American,* who explained why the committee should revise the plans of the Navy Department to the extent of having a board of engineers, not connected with the service, pass on the problem of motive power and, possibly, some other matters which were incidentally introduced. The naval officers present called for the names of such engineers who had gone on record against the departmental project and who, at the same time, had no financial interest in the situation. Mr. Walker is described as having been unable to enlighten the committee by such an identification of disinterested experts. The Senate Naval Committee came finally to the conclusion which had been reached by members of the House committee that the subject under discussion was something with which a congressional committee could not afford to interfere.

"Frank J. Sprague, member of the naval consulting board and chairman of the committee on electricity of that organization, has made public a letter which he had written to United States Senator Claude A. Swanson defending the installation of the electric drive on the new battle cruisers.

"Mr. Sprague, it is said, had the authority of the Secretary of the Navy behind him in forwarding the letter. He is regarded as one of the leading electrical experts in the country and has for years advocated the use of electricity for driving battleships.

"He was by various reasons moved to enter the present controversy now being waged over the question whether electric power or turbines should be used for driving the ships. One of these reasons is the contention that the Navy Department cannot enter such a discussion without revealing a large amount of secret information.

"The plan calls for the installation of 180,000 horsepower electrical engines. 'The wisdom of this decision was challenged,' writes Mr. Sprague, 'by Charles Curtis of the International Curtis Marine Turbine Company, which company would, if geared turbines were adopted instead of the electric drive, be a beneficiary by a large amount of royalties. It is, of course, difficult for one engaged in a commercial enterprise which may be seriously affected to be, even if unconsciously so, unaffected in his judgment by personal interests, but I prefer to believe that Mr. Curtis was actuated by a desire that our cruisers should be the best afloat.

"'Failing to get a reconsideration of the Navy Department's decision a number of prominent engineers have been requested to write, and several have written letters based on certain adverse information supplied them, some condemning without reserve the decision of the department and others urging that the matter be referred to the naval consulting board or some other board of civilian engineers.'

"Mr. Sprague then discusses the issues raised on both sides, whether the electrical equipment required to drive the ship can be constructed and also whether the geared turbines necessary for such a powerful drive can be constructed. Then he continues:

"'Assuming that a favorable reply to both these inquiries could be had . . . What then? Let us assume further that when compared it is found that there are known differences of cost and weights against the electric equipment and certain structural differences inherent to each—a large number of which have not been publicly discussed, and which it would seem unwise to open for general discussion at this critical time, when the spreading broadcast of the detail construction of these ships may well be gravely questioned.

"'Right here any possibility of decision by outside civilian engineers must halt, for it is inconceivable that with all the known facts in hand the Navy Department would or could surrender to outside advisers,

directly or even inferentially, the selection between two known and accepted methods of drive, with their varying influence upon the distribution of weights, location of turrets and armor, size and disposition of compartments and the result of flooding, the distribution of fuel, the distances of machinery from the skin of the ship, provision against torpedo damage, the necessities of handling ships in emergencies and the results of failure of any parts. With these in hand there can be no proper decision except through the proper governmental agencies. Nor is there a single engineer in the lay world who is warranted in taking upon himself any such decision.

"'As I stated, I believe that it is possible to drive ships with geared turbines of the character indicated, but that is simply an assumption from analysis and report. I do not know, and very few other people here know much as to the facts. But I do know, in spite of any statements to the contrary, whatever the authority, that generators and motors of the size indicated can be built, and that if necessary they can even be controlled by a push button from the bridge; and I do not think that I overstate the case when I say that there are few engineers in my profession who will seriously question my assertion in a matter of this kind."

Marine Engineering says:

"Most of the criticism recently aroused against the Navy Department's battle cruiser designs apparently originated either from persons financially interested in some form of propelling machinery which they hoped to have incorporated in these designs or from disinterested but uninformed persons with a smattering of engineering training whose superficial knowledge of warship design and lack of understanding of the military value of the various factors governing the design of these particular vessels make their criticisms practically valueless. Needless to say, the design of every warship represents a compromise, and without a complete understanding of the various factors governing the design, both from a military and from an engineering standpoint, criticisms are of little value. As a matter of fact, the new battle cruisers represent a step far in advance of anything which has so far been attempted in warship design in any country, and the features now subject to outside criticisms have received the unqualified approval of the general board of the navy only after the most careful and mature deliberation."

Shipping Illustrated says:

"The Navy Department may well feel hurt by the incompetent criticism that is being circulated in the lay press concerning the electric machinery of the new battleships and battle cruisers. One feature of the subject that does not seem to be obvious to the average man is that the electric drive is manufactured by an engineering firm that operates its own works, while in the case of steam turbine machinery, the patentees delegate the work to the shipbuilders themselves. Thus, there is every reason on the part of the shipbuilders to attack the electric drive because it takes work away from them. When the first naval vessel fitted with this type of propulsion, the collier *Jupiter* was built, the hull itself having been built at a government yard, very little was said. But when the government decided to install the electric drive in battleships built by contract the shoe began to pinch. Once and for all, however, let it be well understood that the geared turbine would be as great an experiment as the electric drive in the case of a battleship. There may be more experience back of the geared turbine, but this experience as far as the navy is concerned has been derived from small vessels. No foreign battleship that we know of has ever been driven by gearing in connection with steam turbines and if any system of gearing is to be used at all in connection with a battleship it would seem as if the electric drive possessed all the advantages. From all points of view it is regrettable that a feature of engineering about which

even experts are divided should have been dragged down to the irresponsible level upon which it has been put by the ignorant critics of the Navy Department. We hold no brief for the electric drive but we are on principle opposed to the injection of "hot air" into what is purely a scientific question for professional men to decide.

SHIPBUILDERS' ATTITUDE TOWARD NAVAL PREPAREDNESS.—Mr. J. A. Powell, President of the Fore River Shipbuilding Corporation, in an article published in *Marine Engineering*, discusses the attitude of American shipbuilders as follows:

"In considering the growth and future development of American shipbuilding it is impossible to ignore the position of most of the older shipbuilding companies in connection with the movement for national naval preparedness. The larger yards on the Eastern coast have to-day given up about three-fourths of their capacity to naval contracts, and those yards that have been engaged in government business stand ready to work to the limit of their facilities in producing vessels for the navy's requirements. It is in the face of this fact that Congress has been asked to appropriate $12,000,000 in addition to the $6,000,000 appropriated a year ago to fit out a number of navy yards for the construction of capital naval ships. This legislation will probably shortly become a law, with a result that we shall see the national government embarked on a shipbuilding venture running into hundreds of millions of dollars. The labor for this work can only be drawn from private yards and will primarily come from those yards at present building government vessels. In addition to the hampering weight of governmental red tape and inefficiency of productivity, all this labor so diverted will be further decreased by an amount equivalent to the thirty days' annual leave granted every employee in navy yards.

"The Secretary has stated to the naval committee that he desires navy yards to be equipped to build one-third of the vessels required for the navy, working the laborer a single shift of eight hours, and then proceeds to call for equipment for navy yards that would provide for the construction of a continuous program as large as that upon which the government has now embarked. It is significant that never since the battleship *Connecticut* was begun at the New York Navy Yard in 1902 has that yard been without a battleship under construction. Some years only a single battleship has been included in the naval appropriation bill, but always Congress has taken care of its own, and the country at large should take pause and consider the effect of a half dozen arsenals fitted out to carry on this work. It is my belief that this can only result in the creation of a powerful political lobby to carry on the campaign for naval preparedness, whether or not the present need therefor may continue. It is more than possible, even probable, that with this large increase in naval shipbuilding facilities and following the completion of the naval program, great pressure will be brought to bear to expend the $50,000,000 appropriated for the use of the shipping board in the building of merchant ships in government yards, and the stupendous proportions to which this phase of government ownership and operation may develop require the most careful public consideration.

"I am very frankly opposed to this policy. Certain shipyards have offered to build vessels of this naval program on basis of cost and percentage, both overhead charges and profit to be determined by the Federal Trade Commission, and our company has offered to build in competition with the navy yards and at their price, under the supervision of public accountants with a view to disclosing to the public the utter extravagance and wicked wastefulness of this proposed government expenditure. It is a fact that it is impossible to tell and nobody knows to-day what is the cost of building a ship at a government yard. Through a system of bookkeeping that is little less than wilfully deceitful, figures are turned in as

representing costs that have but a vague resemblance to the expenditures actually entailed in warship construction, but the taxpayer pays the balance of the bills, and so long as he does not know what this balance is this unwise expenditure can be expected to continue.

UNIVERSAL MILITARY TRAINING.—Two bills relating to universal military service were introduced in the Congress during the closing days of the session. It is understood that these bills were submitted, not for immediate action, but rather for discussion with the idea of crystallizing opinion by the time the next Congress meets. The text of the two bills is quoted below from the *Army and Navy Journal:*

"THE REVISED CHAMBERLAIN-MOSELEY MILITARY TRAINING BILL.—S. 1695, Mr. Chamberlain.—To provide for the military and naval training of the citizen forces of the United States. Be it enacted, etc., That every male person (a) who is a citizen of the United States or (b) who has made a declaration of intention to become a citizen of the United States shall, except as provided herein, undergo military or naval training as prescribed by the President for a period of six months during the calendar year in which he reaches the age of 19 years, or, if not then, within the description of either (a) or (b) of this section, in the calendar year in which he first comes within such description or in the year immediately following. No person shall be subject to such training after the year in which he attains the age of 26 years, except as otherwise provided in Sec. 2, nor for more than one period of such training. During the first calendar year in which there is training under this act the period of training shall be three months.

"Sec. 2. *Continued Liability to Train.*—That if any person liable to training does not train in any year in which he is subject thereto, he shall, in addition to the penalties prescribed by law, undergo training in the next succeeding year up to the calendar year in which he reaches the age of 26 years, and avoiding training in any year shall constitute a separate offense.

"Sec. 3. *Exemptions.*—That there shall be exempted from training (a) members of the permanent military or naval forces of the United States; and (b) persons physically unfit for any military or naval service whatever; and (c) persons on whose earnings a father, mother, brother, sister, wife, or child is wholly dependent for support. Every person exempted under (b) and (c) of this section shall be required to report for re-examination at periods fixed by regulation, up to and including the year in which he attains the age of 25 years, and if on any such re-examination it is determined that the cause of exemption no longer exists, he shall undergo training in the next training period.

"Sec. 4. *Training of Members of Certain Religious Sects.*—That members of any religious sect or organization now organized and existing whose creed forbids its members to bear arms in war shall not be required to undergo training in the bearing or use of arms, but shall be trained in the non-combatant branches of the military or naval service.

"Sec. 5. *Criminals and Persons of Bad Character.*—That a person who has been convicted of a felony, or who is of notoriously bad character, shall undergo training only in a special unit or units.

"Sec. 6. *Credits for Military Instruction.*—That any person who has completed a course of instruction approved for this purpose by the Secretary of War or by the Secretary of the Navy shall be allowed a credit, which shall consist of the deduction from the training period of not more than one month for each year in which he has completed such course to the satisfaction of the Secretary of War or of the Secretary of the Navy, except that the period of actual training undergone as a member of the Citizen Reserve Army or Citizen Reserve Navy shall never be reduced to less than three months by such credits.

"Sec. 7. *Expenses.*—That persons undergoing training shall receive transportation and subsistence while going to and returning from the place of training, and subsistence, clothing and medical attendance while undergoing training.

"Sec. 8. *Training Strictly Personal.*—That no substitute shall be accepted in place of any person called for training under the provisions of this act, and no such person shall be permitted to escape training or be discharged therefrom by the payment of money or any other thing of value.

"Sec. 9. *Issuance of Certificate and Rosette.*—That each person exempted from training shall receive a certificate of exemption, and each person who has completed his training shall receive a certificate of training and a distinctive rosette showing the year's class to which the wearer belongs. Whenever a certificate or rosette issued under the provisions of this section is lost, destroyed or rendered unfit for use, without fault or neglect upon the part of the person to whom it is issued, a new certificate or rosette shall be issued to such person without charge therefor. No person shall wear a rosette to which he is not entitled, and no person shall use a certificate to which he is not entitled.

"Sec. 10. *Naturalization.*—That no person liable to be trained under this act shall be naturalized as a citizen of the United States unless he has a certificate of training or an unexpired certificate of temporary exemption or a certificate of permanent exemption from training or is undergoing training.

"Sec. 11. *Persons Without Certificate Ineligible to Certain Employments.*—That no person liable to be trained under this act shall hold any position of trust or profit created or authorized by the Congress of the United States unless he has a certificate of training or an unexpired certificate of temporary exemption or a certificate of permanent exemption from training.

"Sec. 12. *Employment of Person Without Certificate Prohibited.*—That no person, corporation, partnership, or association shall hire, engage, employ, or continue to employ, any person up to the age of 28 years who is or has been liable to be trained under this act, unless he has a certificate of training or an unexpired certificate of temporary exemption or a certificate of permanent exemption from training.

"Sec. 13. *Training Districts.*—That for the purposes of this act the Secretary of War shall, subject to the approval of the President, divide the territory of the United States into such training districts as may be convenient, and shall establish for training purposes in each such district one or more cantonments. As far as practicable, such division shall include a single state or group of states.

"Sec. 14. *Registration and Examination.*—That every person liable to undergo training shall register himself or be registered by a parent or guardian, and shall submit to examination as to physical fitness at a place and time fixed by the Secretary of War, except that the President may designate any consular office of the United States as a place of registration and examination for persons resident without the territory of the United States.

"Sec. 15. *Naval Training; Expression of Preference as to Kind and Time of Training.*—That the President may require such portion as he deems advisable of the entire number of persons undergoing training in any year to undergo naval training. Every person may at the time of registration express his preference for training (a) in the army or the navy, or (b) in any arm or corps of either service, or (c) in any time of the year. As far as practicable, any preference so expressed shall be considered in assigning persons to training.

"Sec. 16. *Registration Districts.*—That for the purposes of this act the Secretary of War shall, subject to the approval of the President, provide in each training district such number of registration districts as may be convenient.

"Sec. 17. *Board of Medical Examiners.*—That the President shall appoint a board of medical examiners in each registration district. The board shall consist of three medical examiners, who shall be medical officers of the regular army or navy, the medical reserve corps, or the public health service, or physicians or surgeons legally authorized to practice within the district. Such physicians and surgeons who are not regularly in the service of the United States shall be paid according to the rate of pay of medical officers of the rank of first lieutenant. The board shall examine all persons appearing for registration as to physical fitness, and its decision shall be final.

"Sec. 18. *Board of Registration.*—That the President shall appoint a board of registration in each registration district. The board shall consist of three members to be appointed from officers and employees of the United States. The board shall convene at times fixed by the Secretary of War at one or more convenient places within the district, and shall hear and determine (a) applications for exemptions, except for physical unfitness, and (b) applications for training as a non-combatant. The board or any member thereof shall have power to administer oaths, and shall have the same power as a district court of the United States in civil cases to issue subpœnas for the attendance and testimony of witnesses and the production of documentary evidence and to order the taking of depositions. Any such district court having jurisdiction of the parties shall enforce obedience to the subpœnas of the board, and shall issue and enforce obedience to subpœnas for the taking of depositions. Witnesses shall be entitled to the same fees and mileage as witnesses in such district courts.

"Sec. 19. *Appeals.*—That an appeal from a decision of the board of registration may be made within 30 days to the district court of the United States for the district in which the applicant resides or in which the board was sitting at the time of hearing, or to the court of the first instance of the Philippine Islands, if the applicant resides in the Philippine Islands, or to the district court of Porto Rico if the applicant resides in Porto Rico, or to the district court of the Canal Zone. The decision of such court shall be final. The applicant shall not be required to undergo training while his appeal is pending, but if his application is denied, he shall undergo training during the period of training next following the final determination of his appeal unless otherwise exempt.

"Sec. 20. *Reserve Citizen Army and Reserve Citizen Navy.*—That every person liable to training shall, from the date fixed for the beginning of his training until the end of the calandar year in which he reaches the age of 28 years, be a member of the reserve citizen army, unless designated for naval training, in which case he shall be a member of the reserve citizen navy, and of the class of the calendar year in which he is trained, except that a person while holding a commission or a warrant as officer in the reserve citizen army or the reserve citizen navy shall not be a member of any class. Every person who (a) becomes a member of the permanent military or naval forces of the United States, or (b) having been a citizen of the United States ceases to be such a citizen, or (c) not having been a citizen of the United States permanently removes therefrom shall cease to be such a member. Each member of the reserve citizen army shall be subject to the articles of war, and each member of the reserve citizen navy shall be subject to the articles for the government of the navy, from the date fixed for the beginning of his training until the end of his training. Each member of the reserve citizen army shall be subject to the laws, orders and regulations governing the regular army of the United States, and each member of the reserve citizen navy shall be subject to the laws, orders and regulations governing the navy of the United States, from the date on which he is called by the President into the service of the United States until discharged therefrom. Each such member shall be entitled from the date of reporting for duty under such call to service

and until discharged therefrom to the pay and allowances of an officer or enlisted man of the same grade in the regular army or navy.

"Sec. 21. *Annual Report.*—That the President is authorized to require all members of the reserve citizen army and of the reserve citizen navy to report annually in person for not more than one day during each of the years in which they are members of the reserve citizen army or reserve citizen navy, at places which shall, as far as practicable, be convenient to them.

"Sec. 22. *Mobilization of Reserve Citizen Army and Reserve Citizen Navy.*—That in the event of a defensive war or of imminent danger thereof the President may call into the service of the United States all or any part of the reserve citizen army and the reserve citizen navy. The officers and warrant officers may be called out in accordance with the needs of the service, but the other members of the reserve citizen army and reserve citizen navy shall be called out by classes; the youngest class or any part thereof which the President at the time of any call deems available for service shall be called first. If only a part of one class be called, the President shall apportion the number called among the states, territories and possessions, and the District of Columbia, in the proportion which the population of each bears to the population of all. The reserve citizen army or the reserve citizen navy shall not be used in cases of strikes or other industrial disputes.

"Sec. 23. *Expenses of Mobilization.*—That in the event of call for service the cost of transportation to and subsistence during transportation to mobilization camps and all other expenses of mobilization shall be paid by the United States.

"Sec. 24. *Service Strictly Personal.*—That no substitute shall be accepted in place of any person called for service under the provisions of this act, and no such person shall be permitted to escape service or be discharged therefrom by the payment of money or any other thing of value.

"Sec. 25. *Service of Members of Certain Religious Sects.*—That members of any religious sect or organization now organized and existing whose creed forbids its members to bear arms in war shall not be required to bear or use arms, but shall serve in the non-combatant branches of the military or naval service.

"Sec. 26. *Members of the Regular Army and Navy as Officers of the Reserve Citizen Army and Reserve Citizen Navy.*—That the President may commission officers or enlisted men of the regular army or navy as officers of the reserve citizen army and reserve citizen navy. The Secretary of the Navy may warrant enlisted men in the navy as warrant officers of the reserve citizen navy. Such commissions and warrants shall only be in effect while such officers or enlisted men are in active service with the reserve citizen army or reserve citizen navy or are employed for training hereunder. Such officers and enlisted men shall be entitled to the pay and allowances of their grades in the reserve citizen army and reserve citizen navy while in active service, but not while employed for training hereunder. Officers of the regular army and navy shall not vacate their regular army or navy commissions nor shall they be prejudiced in their relative or lineal standing therein by reason of their service under their commissions in the reserve citizen army or reserve citizen navy. Service with the reserve citizen army shall be deemed service with the troops under the meaning of the Act of August 24, 1912, entitled, 'An act making appropriations for the support of the army for the fiscal year ending June 30, 1914, and for other purposes,' and the Act of April 27, 1914, entitled, 'An act making appropriations for the support of the army for the fiscal year ending June 30, 1915.'

"Sec. 27. *Volunteer Officers of Reserve Citizen Army and Reserve Citizen Navy.*—That the President may commission as officers of the reserve citizen army persons who volunteer for such service and who have passed examination as provided by the Secretary of War, and as officers of the

reserve citizen navy persons who volunteer for such service and who have passed examination as provided by the Secretary of the Navy. There shall be admitted to such examinations (a) officers of the organized militia or naval reserve of any state or territory; (b) members of the officers' reserve corps of the United States Army; (c) men who have attended at least one army training camp or naval training cruise: (d) men who have had at least two years' military training in a school or college approved by the Secretary of War, or at least two years' naval training in a school or college approved by the Secretary of the Navy; (e) men who have had a period of training under this act; (f) other persons whose training has been approved by the Secretary of War or the Secretary of the Navy. Such officers of the reserve citizen army or the reserve citizen navy shall be subject to call by the Secretary of War or the Secretary of the Navy, respectively for service in training persons under the provisions of this act for not more than two months during each of the three years succeeding his appointment, and shall be entitled during such service to the pay and allowances of the same grades of the regular army or navy.

"Sec. 28. *Promotion and Retirement of Volunteer Officers of the Reserve Citizen Army and Reserve Citizen Navy.*—Volunteer officers of the reserve citizen army and reserve citizen navy shall be promoted and retired only under regulations prescribed by the President: *Provided,* That promotions shall only be made after examination. The President shall prescribe according to the necessities of the service the amount of training to be required in each grade.

"Sec. 29. *Discharge of Volunteer Officers of Reserve Citizen Army and Reserve Citizen Navy.*—That at any time the moral character, capacity and general fitness for the service of any volunteer officer of the reserve citizen army or reserve citizen navy may be determined by an efficiency board of three commissioned officers of the reserve citizen army or reserve citizen navy senior to him in rank. If the findings of such board be unfavorable to such officer and be approved by the Secretary of War or the Secretary of the Navy, as the case may be, he shall be discharged.

"Sec. 30. *Organization of Reserve Citizen Army and Reserve Citizen Navy.*—That the President shall organize the reserve citizen army and reserve citizen navy, or such classes thereof as he shall deem expedient, into corps, divisions and other units similar to those in which the regular army and navy are divided, and shall assign officers of the reserve citizen army and the reserve citizen navy to various units.

"Sec. 31. *Co-operation of Other Departments.*—That the President is authorized to employ all other departments and agencies of the government for the purposes of this act to the extent he may deem necessary.

"Sec. 32. *Use of Regular Army and Navy.*—That the President is authorized to employ the regular army and navy, or any part of their personnel, equipment, or matériel, for the purposes of this act. Whenever necessary in order to make available sufficient officers and noncommissioned officers for the purposes of this act the President may, if the public safety so permits, suspend the organization of units of the regular army. The Secretary of War and the Secretary of the Navy shall purchase such further equipment or matériel as may be appropriated for by Congress.

"Sec. 33. *Grounds and Cantonments.*—It shall be the duty of the Secretary of War to acquire by purchase and lease real estate required for the purposes of this act, and to construct, equip and maintain buildings or cantonments, within the amounts appropriated therefor by Congress.

"Sec. 34. *Notice by Proclamation.*—That the President shall, by proclamation posted in a conspicuous place in the post-offices and consular offices of the United States, fix the time and place for any registration, examination, report, enrollment, training or muster into service under this act, and no personal notice shall be necessary to bring any person or class of persons within the provisions of this act.

"Sec. 35. *Pensions.*—That all laws relating to pensions of members of the regular army or navy and their families in time of war shall apply to members of the reserve citizen army and the reserve citizen navy who suffer disability or death while actually undergoing training or while in active service, or while proceeding to or from such training or service, and to the members of their families.

"Sec. 36. *Leave of Absence for Government Employees.*—That all employees of the United States Government shall be allowed a leave of absence without pay during the time that they are undergoing training or reporting under this act.

"Sec. 37. *Employee Not to be Prejudiced.*—That no employer shall in any way penalize or prejudice or attempt to penalize or prejudice, in his employment, any employee for training or appearing for registration, examination, or report under this act, either by reducing his wages or dismissing him from his employment or in any other manner. But this section shall not be construed to require an employer to pay an employee for any time when he is absent from his employment.

"Sec. 38. *False Registration.*—That no person shall make or be a party to any false registration, false examination, false report, false enrollment, or other false response to any call under this act.

"Sec. 39. *Intoxicating Liquors.*—That no person, corporation, partnership, or association shall sell, supply, or have in his or its possession, any intoxicating or spirituous liquors or tobacco at any military or naval station, cantonment, camp, fort, post, officers' or enlisted men's club, navy yard, or aboard ship, which is being used at the time for purposes of training under this act, but the Secretary of War and the Secretary of the Navy may make regulations permitting the sale and the use of intoxicating liquors for medicinal purposes.

"Sec. 40. *Intoxicating Liquors; Persons in Uniform.*—That no intoxicating or spirituous liquors shall be sold to any member of the military or naval forces of the United States while in uniform, nor shall any intoxicating or spirituous liquors be supplied to any such member while in uniform, but the Secretary of War and the Secretary of the Navy may make regulations permitting the sale.

"Sec. 41. *Penalties.*—That any person, corporation, partnership or association violating this act or the regulations made thereunder shall be deemed guilty of a misdemeanor and shall, unless otherwise punishable under the articles of war or the articles for the government of the navy, be punished by a fine of not more than $1000, or imprisonment for not more than 12 months, or both. The running of time under any act limiting the time within which a prosecution for a violation of this act may be commenced shall be suspended as to any person during his absence from the jurisdiction of the United States.

"Sec. 42. *Regulations.*—That the President may make all regulations necessary for carrying out this act.

"Sec. 43. *Time of Taking Effect.*—That in so far as relates to training and to liability to undergo training, this act shall take effect on January 1 of the year next following its passage.

"Sec. 44. *Laws Repealed.*—That all laws and parts of laws, in so far as they are inconsistent with this act, are hereby repealed."

GENERAL STAFF UNIVERSAL SERVICE BILL.—*Draft of an Act for Providing a System of National Defence Based Upon Universal Liability to Military Training and Service, and for Other Purposes.* Prepared by the Army General Staff.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the land force of the United States shall consist of the United States Army. All male citizens of the United States between the ages of 18 years and 45 years, all males between the ages of 21 and 45 years who have legally declared their intentions to become citizens, and all males between the ages of 18 and 21 years

whose parents have been naturalized shall be liable for military service in the U. S. Army, Navy or Marine Corps, except as provided otherwise in this act, when called out by the President for military service in accordance with the provisions of this act; and from and after the date of any such call until such time as they shall be released from such service by competent authority all persons included in such call shall be subject to the Rules and Articles of War so far as they shall be applicable to persons whose permanent retention in the U. S. Army is not contemplated.

Sec. 2. *Composition of the U. S. Army.*—The U. S. Army shall consist of oversea garrisons, the frontier forces, the training forces, the first reserves, the second reserves, the unorganized reserves, the brigade, division, army corps and army headquarters, with their detachments and troops, a general staff corps, an adjutant general's department, an inspector general's department, a judge advocate general's department, a quartermaster's corps, a medical department, a corps of engineers, an ordnance department, a signal corps, the officers of the Bureau of Insular Affairs, the detached officers and chaplains, all organized as hereinafter provided and the following as now authorized by law: The officers and enlisted men on the retired list; the additional officers; the professors, the corps of cadets, the general army service detachment, and detachments of cavalry, field artillery, and engineers, and the band of the U. S. Military Academy; the post non-commissioned staff officers; the recruiting parties, the recruit depot detachments, and unassigned recruits; the service school detachments; the disciplinary guards; the disciplinary organizations, the Indian scouts; and such other officers and enlisted men as are now or may be hereafter provided by law.

Sec. 3. The U. S. Army shall include a permanent and a temporary personnel. The permanent personnel shall include officers, enlisted men and civilians. The officers of the permanent personnel shall include all persons who, on the date of the passage of this act, held commissions or appointments in the regular army and such other persons who shall, in accordance with the provisions of this act, be hereafter appointed or commissioned either permanently or provisionally in such personnel, and the temporary second lieutenants appointed pursuant to Sec. 40 of this act: Provided, That the term "permanent" is employed in this act in connection with the personnel of the several staff corps and departments solely to distinguish the officers and enlisted men permanently belonging thereto and officers of the line detailed therein from reserve officers and non-commissioned officers and recruits temporarily serving therewith, and nothing in this act shall operate to increase the number of officers permanently commissioned in any staff corps or department.

The enlisted men shall include all persons who shall be serving an enlistment in the regular army on the date of the passage of this act and all persons who may hereafter enlist in the U. S. Army in accordance with the provisions of this act: *Provided,* That hereafter all enlistments in the U. S. Army shall be for a period of three years unless sooner discharged in accordance with the provisions of existing law: *Provided further,* That commanders of divisional areas and coast artillery districts may, upon the recommendation of commanders of regiments, battalions or equivalent units, authorize the enlistment and reenlistment for periods of one year unless sooner discharged pursuant to existing law of selected men for service only in the training forces. The civilians shall include all persons other than permanent officers, reserve officers, enlisted men, reservists and recruits, employed for duty with any headquarters or unit of the U. S. Army. The temporary personnel shall include reserve officers, reservists and recruits. The reserve officers shall include all persons holding appointments in the reserve officers' corps. The reservists shall include all persons liable to military service who have completed their prescribed period of training and service in the training forces, and all

other persons liable to military service who are not liable to training and service in said forces. The recruits shall include all persons undergoing training and service in the training forces, who have not completed their prescribed periods of training and service therein. White and colored enlisted or enrolled men shall not be organized in or assigned to the same company, battalion or regiment.

Sec. 4. *The Oversea Garrisons.*—The oversea garrisons shall consist of such permanent commissioned officers, enlisted men and civilians as shall be required for garrison duty outside the continental limits of the United States, and shall be organized as provided in this act into three division headquarters, 10 brigade headquarters, three coast artillery district headquarters, 29 regiments of infantry, five regiments of cavalry, six regiments of field artillery, 74 coast artillery company or equivalent units, three regiments of engineers, three field signal battalions, eight aero squadrons, three balloon companies, the Philippine Scouts organized as now provided by law and such additional staff personnel, and such numbers of engineer, ammunition, supply and sanitary trains or such portions of such trains as the President may direct in accordance with the requirements of the service: *Provided,* That the President is hereby authorized to retain within the continental limits of the United States, until such time as in his discretion their services can be spared, and barracks or quarters therefor provided overseas, such number of units herein authorized as are not on the date of the passage of this act stationed beyond the continental limits of the United States.

Sec. 5. *The Frontier Forces.*—The frontier forces shall consist of such permanent commissioned officers, enlisted men and civilians as shall be required for frontier protection and expeditionary duty at all times, and shall be organized as provided in this act into one division headquarters, three brigade headquarters, six regiments of infantry, three regiments of cavalry, two regiments of field artillery, 47 coast artillery company or equivalent units, one regiment of engineers, one field signal battalion, and two aero squadrons, and such additional staff personnel, and such numbers of engineer, ammunition, supply and sanitary trains or such portions of such trains as the President may direct in accordance with the requirements of the service.

Sec. 6. *The Training Forces.*—The training forces shall consist of such permanent commissioned officers, enlisted men and civilians as shall be required to train and provide for the recruits called out annually for military training and service and, together with the recruits so called out, shall be organized as provided in this act into 16 division headquarters, 64 brigade headquarters, six coast artillery district headquarters, 144 regiments of infantry, 32 regiments of cavalry, 66 regiments of field artillery, 198 coast artillery company or equivalent units, 16 regiments of engineers, two battalions of mounted engineers, 16 field signal battalions, six telegraph battalions, two field signal battalions, mounted, 28 aero squadrons, and eight balloon companies, and such additional staff personnel, and such numbers of engineer, ammunition, supply and sanitary trains or such portions of such trains as the President may direct in accordance with the requirements of the service.

Sec. 7. *The First Reserves.*—The first reserves shall consist of such permanent commissioned officers, enlisted men and civilians, and such reserve officers as shall be assigned thereto under regulations to be prescribed by the President, and of all those reservists, except as otherwise provided in this act, who, having completed their prescribed training and service with the training forces, are liable to military service in the first reserves in accordance with the provisions of this act, and they shall be organized as far as practicable into 16 army corps headquarters, 54 division headquarters, 224 brigade headquarters, 432 regiments of infantry, 96 regiments of cavalry, 198 regiments of field artillery, the coast artillery reserves, with such personnel and organization as the President may pre-

scribe, 48 regiments of engineers, six mounted battalions of engineers, 48 field signal battalions, 18 telegraph battalions, six field signal battalions, mounted, 84 aero squadrons, and 24 balloon companies, and such additional staff personnel and such engineer, ammunition, supply and sanitary trains as the President may direct: *Provided*, That until such time as the necessary number of trained reservists are available for service therein, the President is hereby authorized to assign to the various units of the first reserves but only for service therein in time of actual or threatened hostilities, such number of unorganized reservists as in the discretion of the President shall be necessary to provide for the mobilization of said units at authorized strength in the event of actual or threatened hostilities: *Provided further*, That such unorganized reservists shall be so assigned by classes according to age beginning with the youngest; and notification of such assignment in the manner provided in this act for the notification of persons called out for military service shall be deemed good and sufficient notice to all persons so notified of their said assignment; and no person so assigned shall be required to be physically examined except in time of actual or threatened hostilities.

Sec. 8. *The Second Reserves.*—The second reserves shall consist of such permanent commissioned officers, enlisted men and civilians, and such reserve officers as may be assigned thereto under regulations to be prescribed by the President, and all reservists except as otherwise provided in this act, who, having completed their prescribed military service in the first reserves, are liable for service in the second reserves in accordance with the provisions of this act, and they shall be organized as far as practicable into 16 army corps headquarters, 54 division headquarters, 224 brigade headquarters, 432 regiments of infantry, 96 regiments of cavalry, 198 regiments of field artillery, the coast artillery reserve, with such personnel and organization as the President may precribe, 48 regiments of engineers, six mounted battalions of engineers, 48 field signal battalions, six field signal battalions, mounted, 18 telegraph battalions, 84 aero squadrons, 24 balloon companies, and such additional staff personnel, and such engineer, ammunition, supply and sanitary trains as the President may direct.

Sec. 9. *The Unorganized Reserves.*—The unorganized reserves shall consist of reserve officers and of all reservists, except as otherwise provided in this act, who have completed their prescribed period liable to military service under the provisions of this act.

THE TYPICAL ARMY

Sec. 10. *Composition of Brigades, Divisions, Etc.*—The troops of the oversea garrisons, the frontier forces and the training forces shall at all times be organized as far as practicable into brigades and divisions, and the first reserves and the second reserves into brigades, divisions and army corps, and in time of actual or threatened hostilities the President is hereby authorized to organize all or any number of such divisions and army corps into army corps or armies. The composition of the typical infantry, cavalry and field artillery brigade, the typical infantry and cavalry division, and the typical army corps shall be as prescribed in the act of Congress approved June 3, 1916. The typical army shall consist of a headquarters and two or more army corps. The headquarters of a brigade, a division, an army corps, and an army shall consist of such permanent commissioned officers, enlisted men and civilians as the President may prescribe. Each engineer, ammunition, supply and sanitary train shall consist of such commissioned officers and enlisted men and shall be organized as the President may prescribe. Nothing herein contained, however, shall operate to prevent the President from changing the composition or organization of typical brigades, divisions, army corps or armies, or from prescribing new and different organizations and personnel in lieu thereof as the efficiency of the service may require.

Sec. 11. *General Staff of the Line.*—The general officers of the line of the permanent personnel shall consist of 22 major generals, and 87 brigadier generals.

Sec. 12. *The General Staff Corps.*—The general staff corps shall consist of one chief of staff, detailed from major generals of the line of the permanent personnel, who, while so serving, shall have the rank, pay and allowances of a lieutenant general; two assistants to the chief of staff, who shall be general officers of the line; 28 colonels, one of whom shall be president of the Army War College; 13 lieutenant colonels; and 110 majors and captains; all to be detailed from the permanent commisisoned personnel of the army in accordance with existing law relative to selection and the provisions of this act relative to eligibility for detail, and to perform the duties specified in the organic act of Congress approved Febuary 14, 1903, and at such places as the President may prescribe.

Sec. 13. *The Adjutant General's Department.*—The permanent personnel of the adjutant general's department shall consist of the adjutant general with the rank of brigadier general; seven adjutants general with the rank of colonel; 26 adjutants general with the rank of lieutenant colonel; and 103 adjutants general with the rank of major.

Sec. 14. *The Inspector General's Department.*—The permanent personnel of the inspector general's department shall consist of one inspector general with the rank of brigadier general; four inspectors general with the rank of colonel; eight inspectors general with the rank of lieutenant colonel; 31 inspectors general with the rank of major.

Sec. 15. *The Judge Advocate General's Department.*—The permanent personnel of the judge advocate general's department shall consist of one judge advocate general with the rank of brigadier general; four judge advocates with the rank of colonel; seven judge advocates with the rank of lieutenant colonel; 35 judge advocates with the rank of major; and such number of acting judge advocates as have been or may hereafter be authorized by law.

Sec. 16. *The Quartermaster Corps.*—The permanent commisisoned personnel of the quartermaster corps shall consist of one quartermaster general with the rank of major general; two assistants to the quartermaster general with the rank of brigadier general; 21 colonels; 53 lieutenant colonels; 127 majors; 269 captains; one first lieutenant, and 72 second lieutenants. The enlisted personnel shall consist of 183 quartermaster sergeants, senior grade; 1256 quartermaster sergeants; 689 sergeants, first class; 5441 sergeants; 1314 corporals; 515 cooks; 4880 privates, first class, including enlisted specialists; and 2453 privates. The temporary personnel shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits not exceeding 2800 as may be available for assignment thereto.

Sec. 17. *The Medical Department.*—The medical department shall consist of one surgeon general who shall be a permanent officer with the rank of major general during the active service of the present incumbent of that office and thereafter with the rank of brigadier general, who shall be chief of said department; a medical corps; a medical reserve corps within the limit of time now fixed by law; a dental corps; a veterinary corps; contract surgeons as now authorized by law; the nurse corps as now prescribed by law; an enlisted personnel, and a temporary personnel.

The permanent commissioned personnel of the medical corps shall consist of 48 colonels, 106 lieutenant colonels, 640 majors, 1036 captains, and 1102 first lieutenants, all appointed as now prescribed by law.

The permanent personnel of the dental corps shall consist of 500 dental surgeons. Dental surgeons shall have the rank, pay and allowances of first lieutenants until they have completed five years' service. Dental surgeons of more than nine but less than 19 years' service shall, subject to such examination as the President may prescribe, have the rank, pay and allowances of captains. Dental surgeons of more than 19 years' service

shall, subject to such examination as the President may prescribe, have the rank, pay and allowances of majors.

There shall be 348 veterinarians and assistant veterinarians for duty with the oversea garrisons, the frontier forces and the training forces at the rate of two such officers for each regiment of cavalry, one for every three battalions of field artillery, and one for each battalion of mounted engineers and for duty with the quartermaster corps as inspectors of horses, mules and meats, and the President is hereby authorized, by and with the advice and consent of the Senate, to appoint the additional number of assistant veterinarians authorized. Candidates for appointment as assistant veterinarians shall have the qualifications and shall pass the examinations now provided for by law with reference to rank, pay and allowances; and the President is authorized to appoint such number of reserve veterinarians as may be required to tend public animals pertaining to the quartermaster corps as now prescribed by law.

The enlisted personnel of the Medical Department shall consist of 51 master hospital sergeants, 51 hospital sergeants, 1081 sergeants (first class), 1677 sergeants, 717 corporals, 921 cooks, 184 horseshoers, 184 saddlers, 184 farriers, 184 mechanics, 3083 privates (first class), and 2529 privates.

The temporary personnel shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits not exceeding 33,000 as may be available for assignment thereto.

Sec. 18. *Corps of Engineers.*—The permanent commissioned personnel of the corps of engineers shall consist of one chief of engineers with the rank of brigadier general, 36 colonels, 43 lieutenant colonels, 98 majors, 296 captains, 306 first lieutenants and 158 second lieutenants.

The enlisted personnel shall consist of 86 master engineers, senior grade; 256 master engineers, junior grade; 20 regimental sergeants major; 42 battalion sergeants major; 40 regimental supply sergeants; three battalion supply sergeants; 40 color sergeants; 20 sergeant buglers; 128 first sergeants; 374 sergeants, first class; 126 mess sergeants; 128 supply sergeants; 128 stable sergeants; 1046 sergeants; 1662 corporals; 134 horseshoers; 153 buglers; 125 saddlers; 397 cooks; 3118 privates, first class; 2236 privates; 564 wagoners; one band leader; one assistant band leader; two band sergeants; four band corporals; two musicians, first class; four musicians, second class, and 13 musicians, third class. So much of the commissioned and enlisted personnel enumerated in this section as may be required therefor, shall, together with such number of recruits not exceeding 26,000, as may be available for assignment thereto, be organized into one engineer band, 20 regiments, 40 battalions and two mounted battalions of engineers for service in the oversea garrison, the frontier forces and the training forces as hereinafter provided. Each regiment battalion, mounted battalion, company (regimental), and mounted company of engineers and the engineer band of the oversea garrisons and frontier forces shall have the organization and the maximum personnel now provided by law. Each regiment, battalion and mounted battalion of engineers of the training forces shall have the organization and maximum personnel provided now by law. The permanent personnel of each company (regimental) of engineers of the training forces shall consist of one captain, two first lieutenants, one second lieutenant, one first sergeant, three sergeants, first class; one mess sergeant, one supply sergeant, one stable sergeant, eight sergeants, 12 corporals, one horseshoer, one bugler, one saddler, three cooks, and 24 privates, first class. Its temporary personnel shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 230, as may be available for assignment thereto.

The permanent personnel of each mounted engineer company of the training forces shall consist of one captain, two first lieutenants, one second lieutenant, two master engineers, junior grade; one first sergeant, two sergeants, first class; one mess sergeant, one supply sergeant, one

stable sergeant, six sergeants, 11 corporals, two horseshoers, one saddler, two cooks, one bugler, two wagoners, and 11 privates, first class. Its temporary personnel shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 180, as may be available for assignment thereto.

The permanent personnel of the engineer band shall consist of one band leader, one assistant band leader, one first sergeant, two band sergeants, four band corporals, two musicians, first class; four musicians, second class; 13 musicians, third class, and one cook: *Provided,* That the enlisted force of the corps of engineers and the permanent officers and temporary personnel serving therewith shall constitute a part of the line of the army.

Each regiment, battalion, mounted battalion, company (regimental), and mounted company of engineers of the first and second reserves shall, as far as practicable, have the personnel and organization prescribed herein for like units of engineers while serving as part of an oversea garrison.

Sec. 19. *The Ordnance Department.*—The permanent commissioned personnel of the Ordnance Department shall consist of one chief ordnance with the rank of brigadier general, 13 colonels, 30 lieutenant colonels, 58 majors, 77 captains, and 65 first lieutenants: *Provided,* That hereafter the Secretary of War is authorized to detail not to exceed 100 lieutenants from the permanent commissioned personnel of the U. S. Army at large for duty as student officers in the establishments of the Ordnance Department for a period of two years; and the completion of the prescribed course of instruction shall constitute examination for detail in the Ordnance Department: *Provided further,* That vacancies which may occur in the commissioned personnel of the Ordnance Department shall be subject to the provisions of the act of Congress approved June 3, 1916, relating thereto.

The enlisted personnel of the Ordnance Department shall consist of 213 ordnance sergeants, 295 sergeants, 345 corporals, 1025 privates, first class, and 293 privates.

The temporary personnel of the Ordnance Department shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 1350, as may be available for assignment thereto.

Sec. 20. *The Signal Corps.*—The permanent commissioned personnel of the signal corps shall consist of one chief signal officer with the rank of brigadier general, three colonels, 8 lieutenant colonels, 47 majors, 94 captains, 302 first lieutenants, and the permanent commissioned personnel of the aviation section of the signal corps shall consist of one colonel, one lieutenant colonel, 48 majors, 144 captains, 209 first lieutenants, and 432 aviators, detailed or employed as such.

The enlisted personnel of the signal corps shall consist of 292 master signal electricians, 1088 sergeants, first class; 1178 sergeants, 1832 corporals, 406 cooks, 96 horseshoers, 50 buglers, 2313 privates, first class, and 2473 privates.

The temporary personnel of the signal corps shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 14,400, as may be available for assignment thereto.

The President is hereby authorized to prescribe from time to time the personnel and organization of aero squadrons, field signal battalions, field signal battalions, mounted, and balloon companies of the oversea garrisons, the frontier forces and the training forces and so much of the permanent commissioned and enlisted personnel of the signal corps herein enumerated, including the commisisoned personnel of the aviation section, as may be required therefor, and the recruits of the temporary personnel shall be organized into 36 aero squadrons, 11 balloon companies, 20 field signal battalions, six telegraph battalions and two field signal battalions, mounted.

The personnel and organization of aero squadrons, field signal battalions, field signal battalions, mounted, and balloon companies of the first and second reserves shall be, as far as practicable, the same as the President shall prescribe for like units of an oversea garrison.

Sec. 21. *Bureau of Insular Affairs of the War Department.*—Nothing in this act shall be construed to repeal existing laws relating to the organization of the Bureau of Insular Affairs of the War Department.

Sec. 22. *Chaplains.*—The President is authorized to appoint by and with the advice and consent of the Senate, chaplains in the permanent personnel of the U. S. Army at the rate of not to exceed, including chaplains now in the service, one for each regiment of cavalry, infantry, field artillery and engineers, and one for each 15 companies or equivalent units of the coast artillery corps in the oversea garrisons, the frontier forces and the training forces, with the pay and allowances now prescribed by law.

COMPOSITION OF UNITS

Sec. 23. *Composition of Infantry Units.*—Each infantry, regiment, battalion, headquarters company, machine-gun company, supply company and company in battalion of the oversea garrisons and frontier forces and the Porto Rico regiment of infantry shall have the organization and the maximum personnel now provided by law.

Each regiment of infantry of the training forces shall consist of one colonel and one lieutenant colonel, both of the permanent personnel; one headquarters company, one machine-gun company, one supply company, and 12 infantry companies organized into three battalions of four companies each.

Each battalion of the training forces shall consist of one major and one first lieutenant, mounted, both of the permanent personnel, and four companies.

The permanent personnel of each infantry company in battalion of the training forces shall consist of one captain, one first lieutenant, one second lieutenant, one first sergeant, one mess sergeant, one supply sergeant, eight sergeants, eight corporals, three cooks, one bugler, two mechanics, and five privates, first class.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number of recruits, not exceeding 200, as may be available for assignment thereto for military training and service.

The permanent personnel of each infantry headquarters company of the training forces shall consist of one captain, mounted (regimental adjutant), one regimental sergeant major, mounted; three battalion sergeants major, mounted; one first sergeant (drum major), one sergeant bugler, two color sergeants, one mess sergeant, one supply sergeant, one stable sergeant, one sergeant, two cooks, one horseshoer, one band leader, one assistant band leader, two band sergeants, four band corporals, four privates, first class, and three privates.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number of recruits, not exceeding 80, as may be available for assignment thereto for military training and service.

The permanent personnel of each infantry machine-gun company of the training forces shall consist of one captain (mounted), one first lieutenant (mounted), two second lieutenants (mounted), one first sergeant (mounted), one mess sergeant (mounted), one supply sergeant (mounted), one stable sergeant (mounted), one horseshoer, 4 sergeants, four corporals, two cooks, two mechanics, one bugler, and six privates, first class.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number of recruits, not exceeding 100, as may be available for assignment thereto for military training and service.

The permanent personnel of each infantry supply company of the training forces shall consist of one captain (mounted), one second lieutenant (mounted), three regimental supply sergeants (mounted), one first sergeant (mounted), one mess sergeant, one stable sergeant (mounted), one corporal (mounted), one cook, one saddler, one horseshoer, and 27 wagoners.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number of recruits, not exceeding 50, as may be available for assignment thereto for military training and service.

Each infantry regiment, battalion, headquarters company, machine-gun company, supply company, and company in battalion of the first and second reserves shall, as far as practicable, have the organizations and personnel equivalent in numbers and grades to that prescribed herein for like units of the oversea garrisons.

Sec. 24. *Composition of Cavalry Units.*—Each cavalry regiment, squadron, headquarters troop, machine-gun troop, supply troop and troop in squadron of the oversea garrisons and frontier forces shall have the organization and the maximum personnel now provided by law.

Each regiment of cavalry of the training forces shall consist of one colonel, one lieutenant colonel and one captain, all of the permanent personnel; one headquarters troop, one machine-gun troop, one supply troop, and 12 troops organized into three squadrons of four troops each.

Each squadron shall consist of one major, one first lieutenant, both of the permanent personnel and four troops.

The permanent personnel of each troop in squadron of the training forces shall consist of one captain, one first lieutenant, one second lieutenant, one first sergeant, one mess sergeant, one supply sergeant, one stable sergeant, three sergeants, four corporals, two cooks, two horseshoers, one saddler, one bugler, and eight privates, first class.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number of recruits, not exceeding 140, as may be available for assignment thereto for military training and service.

The permanent personnel of each headquarters troop of the training forces shall consist of one captain (regimental adjutant), one regimental sergeant major, three squadron sergeants major, one first sergeant (drum major), two color sergeants, one mess sergeant, one supply sergeant, one stable sergeant, one sergeant, two corporals, two cooks, two horseshoers, one saddler, seven privates, first class; one band leader, one assistant band leader, one sergeant bugler, two band sergeants, and four band corporals.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number of recruits, not exceeding 115, as may be available for assignment thereto for military training and service.

The permanent personnel of each machine-gun troop of the training forces shall consist of one captain, one first lieutenant, two second lieutenants, one first sergeant, one mess sergeant, one supply sergeant, one stable sergeant, two horseshoers, four sergeants, four corporals, two cooks, two mechanics, one saddler, one bugler, and nine privates, first class.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number of recruits, not exceeding 120, as may be available for assignment thereto for military training and service.

The permanent personnel of each supply troop of the training forces shall consist of one captain (regimental supply officer), two second lieutenants, three regimental supply sergeants, one first sergeant, one mess sergeant, one stable sergeant, two corporals, two cooks, two horeshoers, two saddlers, and 37 wagoners.

Its temporary personnel shall consist of such reserve officers and noncommissioned officers as may be attached thereto and of such number

of recruits, not exceeding 70, as may be available for assignment thereto for military training and service.

Each cavalry regiment, squadron, headquarters troop, machine-gun troop, supply troop and troop in squadron of the first and second reserves shall, as far as practicable, have the organization and personnel equivalent in numbers and grades to that prescribed herein for like units of the oversea garrisons.

Sec. 25. *Composition of Field Artillery Units.*—In time of peace the field artillery shall consist of regiments of mountain artillery, light artillery, horse artillery and heavy artillery of field and siege types. In time of actual or threatened hostilities, the President is authorized to organize from any available personnel, such number of ammunition batteries and battalions, depot batteries and battalions and such artillery parks with such numbers of grades and personnel and such organizations as he may deem necessary. Each regiment of field artillery of the oversea garrisons, frontier forces and training forces shall consist of one colonel, one lieutenant colonel, and one captain, one headquarters company, one supply company and such number of gun and howitzer battalions as the President may direct, and the President may, in his discretion, direct the assembling in the same regiment of gun and howitzer battalions of different calibers and classes. Each gun or howitzer battalion of two or three batteries, each headquarters company of a regiment of two or three battalions, each supply company of a regiment of two or three battalions and each gun or howitzer battery of the oversea garrisons or frontier forces shall have the organization and the maximum personnel now provided by law.

The permanent personnel of each 4.7-inch gun or 6-inch howitzer battery of the training forces shall consist of one captain, two first lieutenants, two seconnd lieutenants, one first sergeant, one mess sergeant, one supply sergeant, one stable sergeant, six sergeants, 11 corporals, one chief mechanic, three mechanics, one bugler, three cooks, one saddler, three horseshoers, and 10 privates, first class.

Its temporary personnel shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 220, as may be available for assignment thereto for military training and service.

The permanent personnel of each 3-inch gun or 3.8-inch howitzer battery shall be the same as prescribed for a 4.7-inch gun battery, increased by the addition of 13 privates, first class, and that of each horse 3-inch gun or 3.8-inch howitzer battery shall be the same as prescribed for a 4.7-inch gun battery, increased by the addition of 25 privates, first class, and four privates. The maximum number of recruits that may be assigned to a 3-inch gun or 3.8-inch howitzer battery, either light or horse, shall be 255.

The permanent personnel of a headquarters company of a regiment of two battalions of the training forces shall consist of one captain, one first lieutenant, one regimental sergeant major, two battalion sergeants major, one first sergeant, one sergeant bugler, two color sergeants, one mess sergeant, one supply sergeant, one stable sergeant, one sergeant, three corporals, one horseshoer, one saddler, one mechanic, one bugler, two cooks, five privates, first class; one band leader, one assistant band leader, two band sergeants, and four band corporals.

When such regiment consists of three battalions, there shall be added to the permanent personnel of the headquarters company, one battalion sergeant major, one corporal, one horseshoer, one mechanic, and one cook.

The temporary personnel of a headquarters company shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 150, for a headquarters company of a two-battalion regiment and not exceeding 135 for a headquarters company of a three-battalion regiment, as may be available for assignment thereto.

The permanent personnel of each supply company of a regiment of two battalions of the training forces shall consist of one captain, one first lieutenant, two regimental supply sergeants, one first sergeant, one mess sergeant, two corporals, two cooks, two horseshoers, two saddlers, two privates, and 21 wagoners.

The permanent personnel of a supply company of a regiment of three battalions of the training forces shall consist of one captain, one first lieutenant, one second lieutenant, three regimental supply sergeants, one first sergeant, one mess sergeant, two corporals, two horseshoers, two saddlers, one cook, five wagoners (chauffeurs), and three privates.

The temporary personnel of a supply company of a field artillery regiment of the training forces shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 45, for a supply company of a two-battalion regiment, and not exceeding 50 for a supply company of a three-battalion regiment, as may be available for assignment thereto.

The permanent personnel of each battalion of field artillery of the training forces shall consist of one major and one captain. It shall be composed of either two- or three-gun or howitzer batteries as the President may direct.

Each field artillery regiment, battalion, headquarters company, supply company and gun or howitzer battery of the first and second reserves shall, as far as practicable, have the organization and personnel equivalent in numbers and grades to that prescribed herein for like units of the oversea garrisons.

Sec. 26. *Coast Artillery Corps.*—The permanent personnel of the coast artillery corps shall consist of one chief of coast artillery with the rank, pay and allowances of a major general, 28 colonels, 28 lieutenant colonels, 85 majors, 423 captains, 423 first lieutenants, 423 second lieutenants, 31 sergeants major, senior grade; 64 sergeants major, junior grade; 62 master gunners, 41 master electricians, 72 engineers, 99 electrician sergeants, first class; 275 assistant engineers, 99 electrician sergeants, second class; 106 firemen, 93 radio sergeants, 319 first sergeants, 319 supply sergeants, 319 mess sergeants, 2552 sergeants, 3828 corporals, 638 cooks, 638 mechanics, 242 buglers, 2448 privates, first class; 7349 privates, 20 band leaders, 20 assistant band leaders, 40 band sergeants, and eight band corporals.

The temporary personnel of the coast artillery corps shall consist of such reserve officers and non-commissioned officers as may be attached thereto and of such number of recruits, not exceeding 17,000, as may be available for assignment thereto.

So much of the permanent commissioned and enlisted personnel enumerated in this section as shall be required therefor, together with the recruits of the temporary personnel, shall be organized into such types of coast artillery units of the oversea garrisons, the frontier forces and the training forces with such organization and personnel as the President may direct: *Provided*, That the number of coast artillery bands organized in either the oversea garrisons or the frontier forces or the training forces, shall not exceed one for every 15 company units or equivalent organizations actually organized.

The coast artillery units of the first and second reserves shall be organized in such types and numbers and with such organization and personnel as the President may prescribe.

Sec. 27. Same as Sec. 22, National Defence Act, which continues existing statutes relating to the Military Academy, etc.

APPOINTMENTS AND PROMOTIONS

Sec. 28. *Original Appointments to be Provisional.*—Substantially the same as National Defence Act, Sec. 23.

Sec. 29. *Promotions.*—Vacancies in grades of general officers existing on date of passage of this act, or created by provisions thereof, shall be

filled as now provided by law: *Provided,* That when the number of colonels of the line is reduced below the number of regiments or equivalent units authorized for the line, the President, in making appointments to the grade of brigadier general, is hereby authorized to extend his selection below the grade of colonel of the line by a number of successive files in the line equal to the difference between such number of regiments or equivalent units and the actual number of such colonels.

The names of all officers in each grade in the infantry, cavalry, field artillery and coast artillery corps shall be arranged upon one list for said four arms combined in the order of seniority of the officers concerned determined by length of commissioned service computed as herein provided and in like manner the names of all officers in each grade in each staff corps and department shall be arranged upon one list for each such corps and department. All officers who are commissioned or appointed in the permanent personnel of the said four arms combined or in any staff corps or department, shall hereafter be promoted subject to such examinations as the President may prescribe upon completion of the following number of years of commissioned service computed as herein provided, to wit: To the grade of first lieutenant after four years, and to the grade of captain after nine years; and no officer shall be eligible for promotion to the grade of major until after he shall have had 19 years of such service or to the grade of lieutenant colonel until after he shall have had 24 years of such service or to the grade of colonel until after he shall have had 27 years of such service, but no officer shall be promoted to the grade of major, lieutenant colonel or colonel when his promotion would operate to increase the number of officers in such grade more than 5 per centum in excess of the number authorized therefor by this act and all promotions to the grades of major, lieutenant colonel and colonel shall be made from officers in the next lower grade on the list of the four arms combined and from officers in the next lower grade on the list of the several staff corps and departments according to seniority: *Provided,* That the total number of officers authorized for the four arms combined or for any staff corps or department shall not be exceeded. In time of actual hostilities the President, by and with the advice and consent of the Senate, is hereby authorized to fill vacancies, occurring in the commissioned personnel of the 1st and 2d reserves, by the promotion to reserve commissions of temporary or permanent officers in accordance with their demonstrated ability in the field and without regard to grade or rank; and in time of actual or threatened hostilities the President alone is hereby authorized to fill vacancies occurring by the detachment of officers or otherwise in permanent commissioned grades in each infantry or cavalry division or coast artillery district in the oversea garrisons, the frontier forces and the training forces by the promotion to temporary commissions of officers serving therewith, according to seniority as determined by said grade list for said four arms combined and by the grade lists for the several corps and departments: *Provided further,* That chaplains and dental surgeons shall not be promoted about the grade of major.

In computing length of commissioned service for rank and promotion, credit shall be given as follows: One day's credit for each day's commission service in the regular army, the volunteers, the navy and the marine corps, and in the case of officers of the medical corps one day's credit for each day's service on the active list in the medical reserve corps. One day's credit for each five days' commissioned service in the national guard or organized militia not in the service of the United States, or as a non-commissioned officer in the regular army or in the permanent personnel of the United States Army as a cadet officer, or in the senior division of the reserve officers' training corps, in a cadet corps in a recognized school or college where a course in military training and instruction substantially equivalent to that prescribed for the senior division of the reserve officers' training corps was conducted, under the supervision of an officer of the regular army. Two days' credit

for each five days' commissioned service in the national guard or organized militia in the service of the United States.

In computing length of commissioned service for promotion, constructive credit shall be given as follows: To chaplains and to officers of the medical corps and dental corps, four years. To officers heretofore appointed in the permanent staff corps and departments whose original appointment in such corps or department was in the grade of captain, nine years: *Provided,* That such constructive service shall include any and all commissioned service prior to appointment to the grade of captain, except that nothing herein shall operate to deprive any officer of any credit for actual commissioned service in excess of nine years to which he would otherwise be entitled.

To officers heretofore appointed in the permanent staff corps and departments whose original appointment in said staff corps or department was in the grade of major, 19 years: *Provided,* That such constructive service shall include any and all commissioned service prior to appointment as major, except that nothing herein shall operate to deprive any officer of any credit for actual commissioned service in excess of 19 years to which he would otherwise have been entitled.

To officers retired and thereafter restored to the active list, such amount of constructive service as shall be necessary under the provisions of this section for them to have reached the grade to which restored on the active list: *Provided,* That such constructive service shall include all commissioned service prior to such restoration.

To graduates of the United States Military Academy as follows: To graduates of the classes of 1917 and 1918, such constructive service as shall be required to place them respectively for purpose of future promotion only immediately after the members of the classes of 1916 and 1917; to the class of 1919 and each succeeding class, two years' constructive service prior to graduation: *Provided,* That for the purpose of this section the classes of 1916 and 1917 shall be deemed to include only such members thereof as shall have not lost rank, files or service for promotion because of sentence of court martial or failure to pass a prescribed examination for promotion.

To any officer who has heretofore lost files or who shall hereafter lose files or service for promotion by reason of a sentence of a court martial or failure to pass a required examination for promotion, only such service for promotion as shall be required to render him eligible for promotion next after the officer who is his immediate senior on the lineal list of his arm or corps pursuant to such sentence or such failure to pass a required examination: *Provided,* That such service for promotion shall be in lieu of all other service therefor, and shall be subject to change whenever it will be necessary to carry into effect any loss of files or service for promotion hereafter incurred by any officer by reason of a court martial or failure to pass a required examination for promotion: *Provided further,* That whenever credit for service shall be given to carry into effect any sentence of a court martial, or to fix the length of service for promotion of any officer in accordance with his failure to pass a required examination for promotion, and the credit so given shall, because of an increase in his arm or corps, credit such officer with less total service for promotion than he would have to his credit if such increase has not occurred, such officer shall be credited with such service for promotion as he would have had to his credit if such increase had not occurred: *Provided further,* That the constructive service above described is authorized for the purpose of regulating only rank and promotion and for all other purposes length of service shall be determined, credited and allowed as now provided by law: *And provided further,* That the President is hereby authorized to delegate to the Secretary of War the duty of signing any or all commissions of persons appointed in the permanent commissioned personnel or the reserve officers' training corps of the United States Army or promoted therein.

RELATIVE RANK BY LENGTH OF SERVICE

Sec. 30. From and after the passage of this act the relative rank of officers of the same grade of the permanent personnel in any grade below that of brigadier general shall be determined by length of commissioned service for promotion, and of any two such officers of the same grade that one shall be the senior in rank who shall be entitled, in accordance with the provisions of this act, to the longer commissioned service for promotion: *Provided,* That where two or more such officers of the same grade shall have the same commissioned service for promotion, that one shall be the senior who shall have had the longest commissioned service in the regular army; and where two or more such officers shall have had the same length of commissioned service in the regular army, that one shall be regarded as the senior who was the senior in relative rank on the date of their original commission in the regular army.

Sec. 31. After the promotions resulting from the provisions of Sec. 29 of this act shall have been made, the names of all permanent officers of the infantry, cavalry, field artillery and coast artillery in each grade shall be entered on one list for each such grade for rank and promotion and the assignment of such officers in any one grade above that of first lieutenant to each of the said arms of the service shall as nearly as may be practicable be made in the ratio which the total number of officers authorized for such grade in all four of said arms combined bears to the total number of officers authorized for such grade in the arm to which assignment is made, and thereafter the President may detach officers from one arm and assign them to another as the interests of the service may require, and, subject only to the rules of seniority and the provisions of law regulating eligibility for detached service, may assign such officers to the command of such units and to such duties as the exigencies of the service may demand.

Sec. 32. Whenever the number of officers available for service in any grade in any arm or for detail in any grade in any staff corps or department or to the detached officers' list is less than the number prescribed for such grade in such arm, corps, or department or for said list, officers of other grades may be assigned or detailed, subject to the rules of seniority, to perform the duties of the grade in the arm, corps or department or on said list in which the deficiency exists, but the total number of officers authorized for any arm or for said list shall not be exceeded and the total number of officers commissioned in any staff corps or department and the number of officers, detailed therein shall not exceed the number of officers authorized for the permanent personnel of such corps or department.

Sec. 33. For a period of four years from the date of the passage of this act, and subject only to its provisions, the President is hereby authorized to detach any officer from his organization or corps and detail him in any staff corps or department or upon any other military duty which the interests of the service may require and for like reasons to continue any officer now so detailed upon his present duty until the end of such period, but no officer so detailed or continued on such duty shall be allowed to continue on such detail or on such duty longer than four years after the date of the passage of this act, and four years after the date of the passage of this act no officer shall be detached from his organization or corps for duty in any staff corps or department unless during the preceding six years he shall have had at least two years' service with troops, and service with troops within the meaning of this section shall be held to include service with any organization of the oversea garrisons, the frontier forces, the training forces, the first reserves or the second reserves: *Provided,* That redetails to the Ordnance Department may be made after one year's service with troops and redetails to the aviation section of the signal corps may be made without regard to service with troops.

Sec. 34. Hereafter, as far as practicable, officers for duty with the oversea garrisons shall be detailed from those officers who volunteer for such duty: *Provided,* That the tour of duty with oversea garrisons shall be for three years unless sooner relieved: *Provided further,* That any officer serving with an oversea garrison may, at his own request if in good health, be detailed to serve therewith for the further period of one year: *Provided further,* That when the number of volunteers for service with the oversea garrisons is not sufficient to meet the requirements of the service, the number of additional officers required shall be detailed by roster: *And provided further,* That all officers and enlisted men serving with the oversea garrisons shall be entitled to a 10 per cent and a 20 per cent increase of pay respectively from the date of leaving the continental limits of the United States to the date of return thereto.

Sec. 35. *Retirement.*—Any officer on the active list holding a permanent commission or appointment in the United States Army, who shall fail to pass any prescribed examination for promotion or who shall have been reported by any officer senior to him duly authorized to make such report, or by his commanding officer as being not qualified to perform the duties of his then grade, shall, if such report is concurred in by the next higher military commander, be immediately ordered before a board, convened by the commander of the divisional area or in case he shall have concurred in such report with respect to such officer then by higher authority, composed of five permanent officers, who shall be senior in rank to the officer whose competency is in question; and such board shall immediately inquire into and report, in the manner now prescribed for retiring boards, upon the competency and capacity of such officer to perform the duties of his then grade, and if such board shall report that such officer is not qualified to perform such duties and such report is approved by the President, such officer shall be immediately retired in accordance with the provisions of this section; and if such board shall report that such officer is qualified to perform such duties he shall be continued on the active list; and any officer so retired shall be entitled to pay, except as herein otherwise provided equal to 2½ per cent of the pay, including increase for length of service to which he was entitled at the time of his retirement, for every year or major fraction thereof that he shall have served as a commissioned officer in the service of the United States prior to retirement; but no officer so retired shall receive more than 75 per cent of such pay: *Provided,* That nothing herein shall operate to reduce the pay now provided by law of any officer now on the retired list: *Provided further,* That any officer holding a permanent commission or appointment in the United States Army who shall be retired for physical disability incurred in line of duty shall be retired with pay equal to 75 per cent of the pay, including increase for length of service which he was receiving at the time of his retirement: *Provided further,* That any officer who shall be found to be incapacitated because of physical disabilities not incurred in the line of duty shall be retired or wholly retired at the discretion of the President: *And provided further,* That any officer who has been or who shall subsequently be retired and who is less than 64 years of age shall be liable in time of peace to perform such military duty consistent with his rank, grade and physical condition, as the President may direct, and while employed on active duty by direction of the President, such retired officer shall be entitled to the active pay and allowance provided by law for his grade. In time of war retired officers over the age of 64 years may, with their consent, be employed upon such duties as the President may direct.

SIXTEEN DIVISIONAL AREAS

Sec. 36. *Divisional Areas.*—The President is hereby authorized immediately after the passage of this act to divide the territory within the continental limits of the United States into 16 divisional areas. Each

such area shall contain as nearly as may be practicable that proportion of the population liable to military service of the whole of said territory which the sum of the authorized maximum enlisted and enrolled strength of the units of the training forces to be stationed in such area, and the enrolled naval contingent to be raised therein, bears to the sum of the total authorized maximum enlisted and enrolled strength of the training forces and the total strength of all naval contingents to be raised within said territory: *Provided*, That the President may, in his discretion, change the limits or boundaries of such divisional areas at any time as changes in population or the interests of the service may require.

Sec. 37. The President is hereby authorized immediately after the passage of this act to group all coast artillery commands and units within the continental limits of the United States into such number of coast artillery districts, not exceeding six, as he may direct and to assign a permanent line officer of appropriate rank, who, whenever practicable, shall be a general officer of the line, to the command of each divisional area and of the troops of the training forces other than those of the coast artillery stationed therein, and to assign a permanent line officer of appropriate rank, who, whenever practicable, shall be a general officer of the line, to the command of each coast artillery district: *Provided*, That the commander of a divisional area shall, in accordance with instructions from higher authority, make all original assignments of enrolled men to the coast artillery units and commands located within his district, but all other matters connected with the coast artillery units and commands shall, in time of peace, be under the control and direction of the commanders of coast artillery districts, subject to the control and direction of the War Department.

Sec. 38. The President is hereby authorized to station in each divisional area as soon as practicable after the passage of this act the proper proportion of available officers and enlisted men of the permanent personnel of the several arms, corps and departments, and to cause the commanders of divisional areas to organize the permanent personnel so stationed in each such area into provisional training regiments, battalions and schools of application and to employ such portion of such personnel as may be required therefor upon any duties or work necessary or convenient for carrying the provisions of this act into effect: *Provided*, That, as far as may be practicable, such provisional training regiments, battalions and schools of application shall be temporarily stationed on existing military reservations.

Sec. 39. The commander of each divisional area and each commander of each oversea department is hereby authorized to convene, as soon as practicable after the passage of this act, such number of boards of officers composed of permanent officers stationed within such area or department as he may deem necessary or convenient for conducting the examinations, in accordance with regulations to be prescribed by the Secretary of War, of such persons resident within such area or stationed therein as may apply, as hereafter provided, for appointment to vacancies already existing or created by this act in the permanent commissioned personnel of the United States Army, and to prescribe at what place or places within such area such board shall meet for the transaction of the business for which appointed: *Provided*, That, as far as may be practicable and consistent with economy, such board shall be ordered to meet at such places as will require the least amount of travel on the part of the majority of the applicants to be examined.

CANDIDATES FOR COMMISSIONED PERSONNEL

Sec. 40. Any officer of the national guard or organized militia or any enlisted man of the regular army or of the permanent personnel of the United States Army not over 40 years of age, or any other male citizen of the United States who is not over said age and who has had previous

military training, service or experience, may apply to the commander of the divisional area or to the commander of the oversea department in which he resides or is stationed for appointment in the permanent commissioned personnel of the United States Army and for authority to take the prescribed examination to determine his fitness for such appointment and for appointment as an officer candidate. (Prescribes the method of conducting the examination for such appointment.) Applicants who have been found by boards to be qualified for such appointment shall, except as herein otherwise provided, when such finding has been approved by the commander of the divisional area or oversea department, be ordered by him as officer-candidates to temporary duty in the divisional area or department in which resident or stationed with a training unit or at a school of application or with a unit of an oversea garrison. Officer candidates shall, from date of appointment as such to date of discharge or to date of appointment to the permanent commissioned personnel or in the reserve officers' corps as the case may be, receive $100 per month and the allowances of a second lieutenant, and during such periods all such officer-candidates shall be subject to the rules and articles of war so far as they may be applicable to persons whose permanent retention in the service is uncertain. Whenever any such officer-candidate is so reported as not qualified for appointment in such permanent commissioned personnel, the board shall report whether he is qualified for appointment in the reserve officers' corps, and if so, in what arm, corps or department and grade therein. Officer-candidates who have been reported by such boards as not qualified for appointment in the permanent commissioned personnel of the United States Army, may, except as otherwise provided herein, be discharged forthwith by the commander of the divisional area, or oversea department, or, with their consent, may be ordered by him to such further period of service with a training unit or in a school of application as he may deem necessary, and all officer-candidates so ordered shall be again reported upon in like manner by such boards upon the completion of such additional period of service.

The President is hereby authorized, by and with the advice and consent of the Senate to appoint officer-candidates who have been so reported by such boards as qualified for appointment in the permanent commissioned personnel of the United States Army to vacancies existing or created by this act in the grades of second lieutenant, first lieutenant and captain, but no officer-candidate shall be so appointed to the grade of second lieutenant who is under 21 or over 27 years of age, or to the grade of first lieutenant who is under 27 or over 32 years of age, or to the grade of captain who is under 32 or over 40 years of age, except that no enlisted man of the regular army or of the permanent personnel of the United States Army shall be so appointed to the grade of captain and no such enlisted man who is less than 27 years of age shall be so appointed to the grade of first lieutenant and no such enlisted man who is over 27 years of age shall be so appointed to the grade of second lieutenant: *Provided*, That applicants for appointment other than officers of the national guard or organized militia and enlisted men of the regular army or of the permanent personnel of the United States Army who have been reported by the boards appointed for their preliminary examinations as qualified for appointment in the permanent commissioned personnel and who, pursuant to the provision of this act, are eligible only for appointment as second lieutenant, shall, if such report is approved by the commander of the divisional area, or oversea department, be reported by him to the War Department, and the President alone is hereby authorized to immediately appoint persons so recommended to the grade of temporary second lieutenant in the permanent personnel, with pay at the rate of $100 per month and the allowances of a second lieutenant, for a period of one year. All temporary second lieutenants shall be assigned by the commander of the divisional area, or oversea department, to duty with a provisional training regiment at a school of application or with a unit of an oversea garrison, and upon the completion

of 11 months of such duty shall be examined by a board of three permanent officers appointed by such commander. Such board shall report which of such temporary second lieutenants are qualified for permanent appointment as second lieutenants in the United States Army, and the names of all persons so reported shall be transmitted by the commander of the divisional area, or oversea department, together with his recommendations in each case, to the War Department for the action of the President.

The President, by and with the advice and consent of the Senate, is hereby authorized to appoint and commission during each calendar year, from among the temporary second lieutenants so reported as eligible therefor, such number of second lieutenants in the permanent personnel of the United States Army as will not exceed 20 per centum of the total number of temporary second lieutenants holding appointment as such during such year.

Any temporary second lieutenant not appointed in the permanent personnel pursuant to this section, may, with his consent, be reappointed a temporary second lieutenant for a further period of one year, and so on from year to year, or if he so elects and is eligible therefor may be appointed to membership in the reserve officers' corps. Temporary second lieutenants shall take rank among themselves according to length of commissioned service computed in accordance with Sec. 29 of this act and such temporary second lieutenants who have had no prior commissioned service shall take rank among themselves according to lot in a manner prescribed by the Secretary of War.

Enlisted men of the regular army or of the permanent personnel of the United States Army who fail of appointment as provisional second lieutenants shall be returned to their proper enlisted grades in their several organizations and the time they shall have served as provisional second lieutenants shall be counted as part of their enlistment periods.

For the purposes of relative rank and future promotion, only each such officer-candidate so appointed to the grade of first lieutenant shall be credited with four years' constructive commissioned service, and each such officer-candidate so appointed to the grade of captain shall be credited for said purposes only with nine years' constructive commissioned service: *Provided*, That such constructive service for the purpose only of determining relative rank shall be in addition to any and all previous actual commissioned service to which persons so appointed shall be entitled in accordance with the provisions of Sec. 29 of this act.

The relative rank of all persons so appointed in each grade shall be in accordance with actual prior commissioned service, determined in accordance with the provisions of Sec. 29 of this act, and of any two such officers that one shall be the senior who shall have had the longer prior commissioned service; and where two or more such officers shall have had the same prior commissioned service they shall take rank among themselves according to age, the oldest to be the senior; and all such officers who shall have had no prior commissioned service shall take rank among themselves according to age, the oldest to be the senior and where two or more such officers are of the same age their seniority among themselves shall be decided by lot, in accordance with regulations to be prescribed by the Secretary of War.

Any officer appointed pursuant to the provisions of this section shall be eligible for assignment at the discretion of the President to any vacancy in his grade existing or created by this act in the oversea garrisons, the frontier forces or the training forces as the interests of the service may require: *Provided*, That nothing in this section shall operate to prevent the President from appointing graduates of the United States Military Academy or enlisted men to commissions in the permanent personnel as provided by existing law.

The President alone is hereby authorized to appoint officer-candidates reported as provided in this section as qualified for appointment in the officers' reserve corps as officers in such corps, subject to the provisions of Sec. 42 of this act.

Sec. 41. *Recruiting Additional Enlisted Personnel.*—As soon as practicable after the passage of this act the President is hereby authorized to provide for the recruitment of the additional enlisted personnel required: *Provided,* That enlistments effected under the provision of this section may be for one year as provided in Sec. 3 of this act.

RESERVE OFFICERS' CORPS

Sec. 42. There shall be organized under such regulations as the President may prescribe, a reserve officers' corps of the United States Army. Said corps shall consist of sections corresponding to the various arms and to the several staff corps and departments of the United States Army. Except as otherwise provided in this act, an officer of the reserve officers' corps shall not, without his consent, be liable to active duty in time of peace, and whenever called out for service shall not, without his consent, be so called out in a lower grade than that held by him in said corps: *Provided,* That the Secretary of War may, in time of peace, order first lieutenants of the medical section of the reserve officers' corps, with their consent, to active duty in the service of the United States in such numbers as the public service may require and the funds appropriated may permit, and he may relieve them from such duty when their services are no longer necessary. While on such duty they shall receive the pay and allowances, including pay for periods of sickness and leaves of absence of permanent officers of corresponding grades and lengths of service on the active list.

All persons now carried as duly qualified and registered pursuant to Sec. 23 of the Act of Congress approved January 21, 1903, and all persons appointed in the officers' reserve corps pursuant to Sec. 37 of the Act of Congress approved June 3, 1916, shall, for a period of two years after the passage of this act, and without any further examination except a physical examination, be eligible for appointment in the reserve officers' corps in the section corresponding to the arm, corps or department in which they shall have been qualified or appointed, pursuant to the above-described laws: *Provided,* That no persons shall be appointed in the reserve officers' corps in any grade above that of lieutenant colonel.

The President alone is hereby authorized to appoint and commission members of the reserve officers' corps, but no person shall be appointed a member of said corps who is less than 19 years of age, and for a period of three years after the passage of this act, no person shall be appointed in the grade of second lieutenant, first lieutenant or captain therein who is more than 40 years of age, and no person, except a commissioned officer of the national guard or organized militia shall be appointed in the grade of major or lieutenant colonel therein who is more than 60 years of age, and no officer of the national guard shall be appointed in the grade of major or lieutenant colonel therein who is more than 63 years of age.

The commissions of all members of the reserve officers' corps shall continue in full effect until terminated by death, promotion, resignation, or dismissal, but upon reaching the age of 64 years, all reserve officers shall be permanently transferred to the unorganized reserves, and thereafter such officers shall not in time of peace be eligible for employment with units or organizations of the United States Army. In time of actual or threatened hostilities officers in the unorganized reserves may with their consent be assigned to such duty as the President may direct.

This section also prescribes the method of giving notice of the number of reserve officers required in each division of area; the method of making application for appointment as a reserve officer and the method of examination, of the officers of the national guard or organized militia or enlisted men of the United States Army applying for appointment, to determine whether they are qualified physically and morally for appointment as officers and have a satisfactory military record.

Provided, That no officer of the national guard or organized militia or such enlisted men shall be appointed in the reserve officers' corps in

any grade higher than that of lieutenant colonel, and any such officer who applies for appointment therein in a grade below that of colonel, but higher than that held by him in the national guard or organized militia, as the case may be; or in an arm, corps or department other than that in which he was commissioned in the national guard or organized militia, shall be required to undergo such further examination relative to his qualifications therefor as the Secretary of War may prescribe.

Provided, That no officer of the national Guard or organized militia shall, without his consent, be appointed in any arm, corps or department in any grade lower than that held by him in such arm, corps or department in the national guard or organized militia: *Provided further,* That after the initial appointments to the reserve officers' corps shall have been made in accordance with this section, appointments to the reserve officers' corps shall be made only from graduates of the reserve officers' training corps in accordance with existing law and from reservists who have completed the prescribed 11 months' continuous service with the training forces, except that any person eligible under the provisions of this section for appointment who was for unavoidable reasons unable to apply therefor within the period prescribed shall be eligible for appointment in accordance with the provisions of this section: *And provided further,* That all members of the reserve officers' corps and all enrolled reservists shall have been called out for service in maneuvers or for training in time of peace or from the date upon which they shall have been called out for service in time of actual or threatened hostilities in accordance with the provisions shall be subject to the rules and articles of war so far as they shall be applicable to persons who do not belong to the permanent personnel of the United States Army.

Sec. 43. Members of the reserve officers' corps shall take rank next after all officers of like grades in the permanent personnel of the United States Army or in the marine corps when detached for service with said army, and shall take rank among themselves in each grade according to date of appointment in such grade.

Officers of the reserve officers' corps appointed on the same date shall take rank among themselves in each grade as follows: First, officers of the national guard; second, officers of the organized militia; third, enlisted men of the regular army or of the permanent personnel of the United States Army; fourth, all other officers so appointed.

Officers of the national guard appointed on the same date to the same grade in the reserve officers' corps, shall take rank among themselves according to length of prior commissioned service in the national guard and organized militia, and when two or more such officers shall have had the same such service they shall take rank among themselves according to total length of enlisted and commissioned service in the national guard and organized militia.

Officers of the organized militia appointed on the same date and the same grade in the reserve officers' corps, shall take rank among themselves according to length of prior commissioned service in the organized militia, and when two or more such officers shall have had the same prior commissioned service they shall take rank among themselves according to total length of enlisted and commissioned service in the organized militia: *Provided,* That commissioned or enlisted service in the national guard and organized militia in the service of the United States shall count double: *Provided further,* That when two or more officers of the national guard or organized militia cannot be graded with respect to rank, as above provided, they shall take rank among themselves in accordance with their relative rank in the national guard or organized militia prior to appointment in the reserve officers' corps. Enlisted men so appointed shall take rank among themselves according to length of service as non-commissioned officers, and those who shall have had no such service shall take rank among themselves according to age.

All other persons so appointed on the same date in same grade shall take rank among themselves according to age, the oldest to be the senior; and when two or more officers are of the same age, their seniority shall be decided by lot in a manner prescribed by the Secretary of War.

Sec. 44. Vacancies occurring in time of peace in any grade below that of colonel in the reserve officers' corps shall be filled by the promotion, subject to such exceptions as the President may prescribe in regulations governing the promotion, examinations for promotion and assignment of reserve officers, of officers of said corps in the next lower grade in the reserve unit, corps or department in which such vacancies occur: *Provided*, That officers of the reserve officers' corps, if they so elect, may qualify for promotion and be promoted in the first or second reserves even though no vacancy exists in the next higher grade in their regiment, battalion, squadron, corps or department, and when the number of officers in any grade in any unit, corps or department of the first reserves exceeds the number authorized therefor, the commander of the divisional area may transfer such surplus officers to other organizations of the first reserves or to the second reserves or he may attach them to organizations in the first reserves.

In time of war, officers of the reserve officers' corps may be promoted to any grade or rank in such corps in accordance with their efficiency as demonstrated in service in the field: *Provided*, That appointments to grades above that of colonel so made shall be made by and with the advice and consent of the Senate.

Sec. 45. Any member of the reserve officers' corps assigned or attached to either the first or second reserves who shall have been reported by his commanding officer, or by any other officer duly authorized to make such report, as not qualified to perform the duties of his then grade, shall, if such report is concurred in by the next higher military authority, be immediately ordered before a board composed of five reserve officers senior in rank to the officer so ordered; and if such board shall report that such officer is not qualified to perform such duties and such report is approved by the President, such officer shall forthwith be transferred to the unorganized reserves and shall not again be eligible for assignment to duty with either the first or the second reserves: *Provided*, That any member of the reserve officers' corps who shall have been convicted of any offence involving moral turpitude or which, in the opinion of the President, was unbecoming an officer and a gentleman shall be forthwith dismissed: *Provided further*, That all members of the reserve officers' corps, who are assigned to either the first or second reserves, shall, as soon as they reach the age of 64 years, be transferred to the unorganized reserves, and no reserve officer over the age of 64 shall in time of peace be eligible for assignment or attachment to either the first or second reserves.

Secs. 46, 47. Provide for the purchase or condemnation of land required.

Sec. 48. As soon as the President shall decide that the necessary training personnel has been organized and trained, the necessary ground acquired, the necessary structures erected and the necessary military supplies and equipment provided in each divisional area, he is hereby authorized and empowered to call for military training and service to serve in the United States Army in accordance with the provisions of this act and to report for such service on November 1 next thereafter all persons liable to military service who have arrived or who will arrive at the age of eighteen years during the year ending on the day next preceding such November 1; and in each subsequent year ending on October 31 all males liable to military service who arrive at the age of 18 years during such year shall likewise be called out to report for military training and service in the United States Army on November 1 of that year, in accordance with the provisions of this act.

Sec. 49. Except as otherwise provided in this act, service in the United States Army in time of peace shall be for a period of 12 years unless sooner discharged, the first 11 months of said period shall be in continuous

training and service in the training forces, the next four years and one month shall be in the first reserves and not more than one period of 15 days' active service in any calendar year for two years shall be required of any enrolled member of said reserves during his period of service therein in time of peace. The last seven years of said 12-year period of service shall be in the second reserves, and reservists assigned thereto shall not be called out for active service in time of peace: *Provided*, That no reservist assigned to the first reserves shall be eligible for appointment in the reserve officers' corps unless he shall have served with his organization during all periods of active service prescribed therefor from the date of his assignment thereto to the date of his appointment in said corps: *Provided further*, That all persons who shall have been commissioned, appointed, enlisted or enrolled in the United States Army at the outbreak of war or when war becomes imminent may be held to service therein during the continuance of war or until the President shall decide that war is no longer imminent, and this without regard to the periods for which such persons shall have been commissioned, appointed, enlisted or enrolled: *And provided further*, That enrolled non-commissioned officers and enlisted specialists who have completed their 11 months' continuous active training and service may, with their consent, be retained with or attached to the training forces for further stipulated periods of training and service, and any enrolled man who has satisfactorily completed his 11 months' continuous training and service may be permitted to enlist in the permanent personnel in one of the arms or corps of the United States Army, and any reservist so enlisting shall, upon completion of his service under such or any subsequent enlistment, revert to the reserve status he would then occupy if he had not so enlisted.

THE CALL TO SERVICE

Sec. 50. In time of peace the President may by proclamation call out for active service, in accordance with the provisions of this act, any class of persons liable for such service, and in time of actual or threatened hostilities he may likewise by proclamation call out for military service such classes of persons according to age, beginning with the youngest liable for such service, as shall be required for the national defence: *Provided*, That in time of peace no part of the training forces or of the first or second reserves shall be called out to execute the laws, suppress insurrection or repel invasion, without the authority of Congress first had and obtained, except in cases of actual or threatened invasion occurring while Congress is not in session, and then only when in the judgment of the President it would be dangerous to wait for Congress to assemble.

Sec. 51. The President is hereby authorized to delegate to the commander of each divisional area the necessary authority to commence the organization, as soon as practicable after the passage of this act, of such units of the first reserves as are to be organized in such area; to subdivide such divisional area into three reserve areas; to subdivide each such reserve area into districts and subdistricts; to prescribe the limits of each such reserve area, district and subdistrict; to prescribe what units of the first reserves authorized for such divisional area shall be located in each such subdivision; and, subject to the approval of the President, to assign a competent officer of the permanent personnel of the training forces in such area of appropriate rank to the command of each division, brigade and regiment of the first and second reserves to be organized in such divisional area. Each officer so assigned shall, in time of peace, have reserve rank appropriate to the command to which appointed, but shall receive only the pay and allowances provided for his actual grade and rank in the permanent personnel. In time of war he shall have the rank, pay and allowances appropriate to such command.

Each such commander of a reserve regiment shall, subject to such regulations as the President may prescribe and to the supervision of

superior military authority, have full charge of all matters connected with the enrolment and records of all reserve officers and non-commissioned reservists belonging to his regiment; of all plans for drawing upon the unorganized reserves for the necessary personnel in the event of actual or threatened hostilities; of all matters connected with the mobilization of his regiment in peace or war or relating to its equipment or the training of its personnel: *Provided,* That each officer of the permanent personnel assigned to the command of a division, a brigade or a regiment of the first or second reserves shall also be assigned or attached to a unit of the training forces, and in addition to his duties with the first or second reserves, he shall be required to perform such other duties in such unit of the training forces as the commander of the divisional area shall prescribe.

The organization, peace administration and training of all units located in a reserve area, other than regiments and brigades, shall be conducted under the supervision of the commanders of reserve divisions who shall be assisted in such duties by such other officers of the permanent personnel as may be designated therefor by the commander of the divisional area: *Provided,* That each reserve area, district and subdistrict prescribed for the location and organization of a unit of the first reserves shall likewise be prescribed for the location and organization of a corresponding unit of the second reserves: *Provided further,* That the commander of each divisional area is hereby authorized to change the limits of reserve areas, districts and subdistricts to conform to changes which may occur in the distribution of population liable to military service or to assign surplus reservists in one such subdivision to a reserve until located in another.

Sec. 52. The commander of each divisional area when notified of the appointment or promotion thereof is hereby authorized to assign members of the reserve officers' corps resident in such area to units of the first and second reserves, located within such area and to such other duty appropriate to their rank and grade that may be consistent with the provisions of this act and with regulations prescribed pursuant thereto: *Provided,* That as far as their places of residence may render such action practicable, such reserve officers shall be assigned according to seniority in each grade to units of the first reserves and second reserves in the order named. Reserve officers so assigned shall in time of peace be liable for active service for not exceeding two weeks in any one year: *Provided further,* That such officers may with their consent be ordered to active duty for longer periods, and reserve officers and non-commissioned officer reservists who are candidates for promotion may be required to undergo such active service, prior to promotion, in excess of two weeks per year as the President may prescribe as necessary for their further military training: *Provided further,* That whenever during maneuvers in time of peace or in time of actual or threatened hostilities officers of the permanent personnel of the United States Army are detached from the organizations to which assigned, for duty with the first or second reserves, a corresponding number of reserve officers may be attached to the permanent personnel of the organizations from which such permanent officers were detached for temporary duty therein: *Provided further,* That subject to such regulations as the Secretary of War may prescribe, honorably discharged enlisted men of the regular army, the United States Army and the national guard or organized militia and enlisted men of good character of the national guard and organized militia, may, with their consent, be enrolled as reserve non-commissioned officers and assigned to reserve organizations: *And provided further,* That whenever a reserve officer or an enrolled reservist changes his residence to a place at such distance from the location of the unit to which he is assigned as to render his further service therein undesirable, he shall be detached from such unit and assigned or attached to another reserve unit located in the vicinity of his new place of residence and it is hereby made the military duty, for

failure to perform which the offender shall be subject to trial and punishment by a military tribunal in accordance with the rules and articles of war, of each reserve officer and enrolled reservist who shall change his place of residence to notify his immediate commanding officer prior to making such change.

Sec. 53. The pay and allowances of all permanent commissioned officers and enlisted men belonging to the personnel of any arm, corps or department of the U. S. Army or employed on any duty authorized by law, shall be the same as that now prescribed by law for like grades and arms in the regular army, except that in lieu of a money allowance for clothing to enlisted men on the active list, the President is hereby authorized to prescribe the articles of clothing that shall be issued for the use of enlisted men in each grade in each arm and corps.

Sec. 54. The pay of all persons in the U. S. Army, other than the officers, enlisted men and civilians of the permanent personnel, shall, except as otherwise provided in this act, in time of peace be one-third of the pay prescribed by law for like grades in the regular army. The allowances of all persons in the U. S. Army, other than those enumerated in the preceding section, shall at all times be the same as prescribed by law for like grades and arms in the regular army, except that in lieu of a money allowance of clothing to enlisted and enrolled men, the President is hereby authorized to prescribe the articles of clothing that shall be issued for the use of enlisted or enrolled men in each grade in each arm and branch of the service: *Provided*, That no person shall be entitled to the pay or allowances hereinbefore prescribed in this section except for such time as he shall have actually served on active service in time of peace pursuant to the orders of competent authority issued in accordance with the provisions of this act: *Provided further*, That in time of actual hostilities, all persons in the U. S. Army shall be entitled to the pay now prescribed by law for like grades in the regular army.

Sec. 55. No person whomsoever shall be entitled to or given any money or other valuable thing whatsoever as bounty or as a fee or gratuity for enlisting, enrolling, accepting a commission in, or in any other manner entering the military service of the United States: *Provided*, That the provisions of this section shall not operate to prevent the payment of reenlistment pay or bonus for reenlisting in the permanent military establishment as provided by law.

EXEMPTIONS AND LIABILITIES TO SERVICE

Sec. 56. The following persons be, and they are hereby, excepted and made exempt from liability to military training and service in time of peace under the provisions of this act, to wit: Such as are rejected as totally physically or mentally unfit for military training and service; the only son liable to military training and service of a widow dependent upon his labor for support; the only son liable to military training and service of aged or infirm parent or parents dependent upon his labor for support: *Provided*, That when there are two or more sons of such aged or infirm parents liable upon the provisions of this act for military training and service, the father, or if he be dead, the mother, may elect which one of such sons shall be exempt; the only brother of children not 12 years of age dependent upon his labor for support: *Provided further*, That any person exempted from military training and service in accordance with the provisions of this section, except when such exemption is based upon permanent total physical or mental unfitness therefor, shall be exempted for one year only, but such exemption upon sufficient showing that one of the authorized bases therefor exists, may be again exempted for a further period of one year, and so on from year to year: *And provided further*, That any person who shall be exempted from liability to military training and service or who shall for any cause not have been duly registered in accordance with the provisions of this act, shall, nevertheless,

become liable to such military training and service with the class of recruits called out for such training and service on November 1 next following the date on which his exemption shall have ceased or on which he shall have been duly registered, providing that he shall not become more than 24 years of age during such calendar year.

The following persons be, and they are hereby, excepted and made exempt from liability to perform military service under the provisions of this act in time of war or when war is imminent, and from liability to assignment to and service in the first and second reserves in time of peace, to wit: Such as are rejected as totally physically or mentally unfit for military service; also, first, the Vice-President of the United States, the judges of the various courts of the United States, the members of the House of Representatives and the Senate of the United States, the heads of the various executive departments of the United States, the United States district attorneys and their authorized assistants, the United States marshals and their authorized assistants and deputies, the United States commissioners, postmasters and assistant postmasters of all grades; second, the governors, the members of the legislature, the heads of the various executive departments and the judges of the various courts of the several states, territories and districts; third, the only son of a widow dependent upon his labor for support, the only son of aged or infirm parent or parents dependent upon his labor for support: *Provided,* That when there are two or more such sons, the father, or if he be dead, the mother may elect which of such sons shall be exempt; the only brother of children under 12 years of age dependent upon his labor for support; the father of motherless children under 12 years of age dependent upon his labor for support; fourth, any person in Federal employ of the United States whose services are, in the discretion of the President, necessary for carrying out the provisions of this act. And no person, but such as are herein exempted, shall be exempt for liability to military service in time of war or when war is imminent. Such exemption shall continue only so long as such person shall remain totally physically or mentally exempt from military service if such exemption is based on physical or mental unfitness, or only so long as such person shall hold such office or perform such service, if such exemption is based upon official position or service, or only so long as the condition of dependency exists if such exemption is based upon a condition of dependency.

Sec. 57. No substitute shall be accepted in place of any person called out for military service pursuant to this act, and no such person shall be permitted to escape such service or to be discharged therefrom prior to the expiration of his term of service by the payment of money or any other valuable thing whatsoever as consideration for his release from military service or liability thereto.

Sec. 58. Any person liable for military service under the provisions of this act, who shall be accepted and called out for such service under this act, and who shall under oath declare that he is conscientiously opposed to the bearing of arms and is prohibited from so doing by the tenets, rules and articles of faith of any now existing religious denomination to which he belongs, and who shall prove by satisfactory evidence that his conduct and deportment have been uniformly consistent with such declaration, shall be employed on such duties, not involving the bearing of arms, as the Secretary of War may direct.

Sec. 59. Any person liable for military service under the provisions of this act, who, having been duly called out for military service, shall fail or neglect to report himself for such service at the time and place designated therefor, or who shall forcibly or otherwise resist or oppose such service, shall, if found to be physically qualified for military service, be punished as a court-martial may direct and shall be held to such military service in accordance with the provisions of this act.

Sec. 60. During the first year beginning after the passage of this act, the following persons shall be liable to registration, to wit: First, all

male citizens of the United States and all males of naturalized parents who have arrived or shall arrive at the ages of 18 to 21 years, both inclusive, during such calendar year, and all male citizens of the United States, and all males of foreign birth who have legally declared their intention to become citizens, who arrive at the ages of from 21 to 24 years, both inclusive, during such calendar year; second, all aliens residing or traveling within the territory of the United States over 18 and under 25 years of age.

After the first year male citizens and males of naturalized parents are liable to registration on arriving at the age of 18. The age for registration of other male citizens and naturalized citizens is extended in the second year to 30 years, in the third year to 35, in the fourth year to 40, and in the fifth year to 44. The age of aliens is increased the second year to 30, and the third year to 35, the fourth year to 41, and the fifth year to 45.

During the sixth year beginning after the passage of this act, the following persons shall be liable to registration, to wit: First, all male citizens of the United States and all males of naturalized parents, who arrive at the age of 18 years during such calendar year; second, all unregistered aliens residing or traveling in the jurisdiction of the United States; third, all persons liable to registration during any preceding year who for any cause were not so registered.

During the seventh and each subsequent calendar year, the following persons shall be liable to registration, to wit: First, all male citizens of the United States and all males of naturalized parents, who arrive at the age of 18 years during such calendar year; second, all persons liable to registration who have not been previously registered: *Provided*, That in time of actual or threatened hostilities the President is hereby authorized to cause all or any class or classes of persons liable under the provisions of this section for registration, to be registered during such year or years as he may designate, and this without regard to the year prescribed in this section for their registration. Failure to register during the year and period thereof so prescribed by the President shall subject the offender to the penalties provided in this act for the commission of a like offence in time of peace.

Sec. 61. The President is hereby authorized and empowered to designate annually such periods as he may deem necessary for the registration of such persons who, under the provisions of this act, are liable for registration during such calendar year, and it is hereby made the duty of each such person so liable for registration to appear personally, during the period or periods so designated for his registration, at the post office nearest in point of actual distance to such person's residence or place of business or sojournment, or in the case of an alien traveling within the jurisdiction of the United States, or of any state thereof, at a terminus on his route of travel, and then and there to submit to registration, and in case he is liable for military service under the provisions of this act, to then and there declare whether he claims exemption from such military service, and if so, the facts upon which his claim is based.

Sec. 62. Prescribes that the posting of the President's proclamation is sufficient notice.

Sec. 63. Prescribes the forms to be furnished by postmasters.

Secs. 64-67. Prescribe the duties of postmasters in the matter of registration.

Sec. 68. No person registered under the provisions of this act shall be entitled to any pay, allowances, fees, subsistence or commutation therefor, or any monetary or other compensation or reimbursement whatever for time employed or expenses incurred in complying with the provisions of this act relative to registration, except as otherwise provided in this act.

Sec. 69. Any person liable for registration under this act who shall fail or neglect to present himself for registration at the place and during the period designated, or who shall forcibly or otherwise resist or oppose such registration, or who, having duly presented himself, or having been

in any manner presented for registration, shall fail, neglect or refuse to answer fully, truthfully and without equivocation, any question asked him by the postmaster or his assistant, relative to such registration, shall, upon conviction, be punished by a fine of not less than $10 nor more than $200, and by imprisonment for not less than one month nor for more than one year, and shall be duly registered.

Secs. 70-72. Require notice of change of residence and its record by the postmaster.

Sec. 73. Prescribes the method of claiming exemption from military service.

Sec. 74. Prescribes the physical examination of those registered.

Sec. 75. Four cents a mile is to be allowed for travel to those physically examined.

PENALTIES FOR VIOLATING THE LAW

Sec. 76. Any person liable for military service under this act, who shall fail or neglect to present himself for physical examination at the time and place appointed, or who shall forcibly or otherwise resist or oppose such physical examination, or who, having duly presented himself or having been presented in any manner for physical examination, shall fail, neglect or refuse to answer fully, truthfully and without equivocation any question relative to such examination asked him by any officer or other person engaged in making such examination, shall, upon conviction, be punished by a fine of not less than $10 nor more than $200 and by imprisonment for not less than one month nor for more than one year, and shall be physically examined.

Sec. 77. Any person who shall leave his place of residence or sojournment with intent to avoid registration, physical examination or military service shall, upon conviction, be deemed guilty of failing to present himself for registration, physical examination or military service, as the case may be, and punished accordingly: *Provided,* That all persons charged with leaving their place of residence or temporary abode with intent to avoid military training or service shall be tried by military tribunals.

Secs. 78-80. Prescribe fine and imprisonment for fraud in registration or failure to notify authorities of such fraud.

Sec. 81. Any person who, acting for himself or for one or more other persons or for a corporation, shall give employment to any person who, being liable for military service and having been duly called out for same, has not completed the prescribed service in the training forces or been furloughed to the reserves, or who, being liable for registration or physical examination, has not duly submitted thereto, shall, upon conviction, be punished by a fine of not less than $10 nor more than $200 and by imprisonment for not less than one month nor more than three months.

Sec. 82. In time of actual or threatened hostilities any sentence of imprisonment or portion of such sentence imposed by any court for any offence not involving moral turpitude upon any person liable for military service, which shall be unexecuted on the date of enrolment of such persons in the military service, shall be executed under the military authorities. In time of peace any such sentence shall be executed under the civil authorities, and the person so punished, if liable to military service and not over 24 years of age when such sentence shall have been executed, shall be liable for military service and training with the class of recruits called out to report therefor on November 1 next following the execution of his sentence.

Sec. 83. Any person whomsoever who knowingly shall under oath make any false or misleading statement, either orally or in writing, in connection with any claim for exemption from military service under this act shall, upon conviction, be deemed guilty of perjury and punished accordingly.

Sec. 84. Any person whomsoever who shall knowingly procure or cause to be made any false or misleading statement under oath in connection

with any claim for exemption from military service under this act, shall, upon conviction, be deemed guilty of subornation of perjury and punished accordingly.

Sec. 85. One-half of any fine adjudged to go to informant.

Sec. 86. It shall be lawful at any time for any person authorized by the laws of the United States or of any state, territory or district, to make arrests, to arrest summarily and place in the custody of the proper United States official for examination or trial any person who such person authorized to make arrests has reasonable grounds for believing has violated any of the provisions of this act, and, in time of war or when war is imminent all persons in the naval and military service of the United States are hereby clothed with like authority to make such arrests.

GENERAL PROVISIONS

Sec. 87. Nothing in this act shall operate to deprive any permanent enlisted man in the United States Army of any of the rights or privileges respecting retirement or pension which are now provided by law for enlisted men of the regular army, or to deprive any permanent officer of the United States Army of any of the rights or privileges respecting pensions which are now provided by law for officers of the regular army, but no person in the United States Army other than the permanent officers and enlisted men described in Sec. 3 of this act shall be entitled to retirement, and no person in the United States Army other than such permanent officers and enlisted men shall be entitled to pensions except for physical disabilities incurred in line of duty while employed on active duty pursuant to the orders of competent authority or while, pursuant to such orders, proceeding from their homes to posts of duty and thence to their homes.

Sec. 88. Amends Sec. 35 of the Act of March 4, 1909, Criminal Code, concerning frauds upon the Government.

Sec. 89. The Secretary of War is hereby authorized to prescribe all regulations and forms and to designate or prescribe all persons necessary or convenient for carrying out the provisions of this act in all cases in which authority to prescribe such regulations or forms or to designate such persons is not by the provisions of this act delegated to another person.

Sec. 90. All commissioned officers in the regular army shall be included in the permanent commissioned personnel of the United States Army, and the inclusion of any such officer therein shall not operate to reduce his rank or the pay and allowance to which he as an officer in the regular army was entitled on the date of the passage of this act.

Sec. 91. All provisions of the act of Congress approved June 3, 1916, relating to the officers' reserve corps, the training camps for selected civilians, the national guard, the composition of the militia and all laws and parts of laws in conflict with the provisions of this act are hereby repealed: *Provided,* That members of the reserve officers' training corps shall be eligible for appointment in the reserve officers' corps under the conditions provided in the act of Congress approved June 3, 1916, relative to eligibility to appointment in the officers' reserve corps: *Provided further,* That from and after five years after the passage of this act no part of any appropriation for the raising, equipping, arming, paying, supplying, training, sheltering, subsisting or transporting troops shall be used for equipping, arming, paying, supplying, training, sheltering or transporting any person who not commissioned, enlisted, appointed, enrolled or employed in the United States Army, the reserve officers' training corps or the militia of the Hawaiian Islands of Porto Rico: *And provided further,* That nothing herein shall operate to release or relieve any state, territory or district, or corporation, or natural person from any accountability, responsibility, liability or indebtedness to the United States for any money, or moneys, or any property whatsoever which shall have been or may hereafter be entrusted to any such state, territory, or district, or to any such corporation

or natural person, and until such time as all such accountability, responsibility, liability and indebtedness shall have been finally settled according to law, all existing laws and parts of laws relating to such settlements shall remain in full force and effect.

THE OVERMAN BILL.—The provisions of the Overman "Espionage Bill," which passed the Senate March 10, is summed up by the Philadelphia *North American* as follows:

"1. Unlawful intrusion upon or approach to any vessel, fort, railroad, camp, navy yard, or 'other place connected with the national defence or under control of the United States,' for the purpose of obtaining information, or any attempt unlawfully to collect or dispose of it—$10,000 fine or two years' imprisonment.

"Attempted delivery to a foreign government of such information—20 years' imprisonment, or, in time of war, life imprisonment.

"Spreading false information in time of war to interfere with military or naval operations—fine and life imprisonment.

"Harboring of a spy—fine and imprisonment.

"2. False swearing to influence the conduct of a foreign government or to defeat any measure of the government of the United States in any foreign controversy—$5000 fine or five years.

"3. Impersonation of duly accredited foreign officials—same penalty.

"4. Fraud in obtaining or using passports—$2000 fine or five years.

"5. Fraudulent use or counterfeiting of any government seal or commission—$5000 fine or ten years.

"6. Conspiracy to injure or destroy property in any foreign country with which the United States is at peace—$10,000 fine or two years.

"7. Inspiring or taking part in any military or naval enterprise against such a country—$3000 fine or three years.

"8. Attempted escape of interned persons—arrest and confinement. Aiding in such escape—$1000 fine or one year.

"9. Authorizing the President to order seizure of arms and munitions of war about to be exported or used in violation of the neutrality and the laws of the United States.

"10. Empowering the President to arrest vessels attempting to depart on errands of assistance to belligerent vessels in violation of American neutrality. Penalty for convicted offenders against these provisions, $10,000 fine or five years.

"11. Authorizing the Secretary of the Treasury, under proclamation of the President, to regulate the conduct of all vessels in American ports in case of war or disturbance of international relations, actual or threatened. Penalty for wilful destruction or injury of any vessel, domestic or foreign, in an American port or territorial waters, $10,000 fine or two years.

"12. Punishing wilful injury or attempted injury to any vessel engaged in foreign commerce by $10,000 fine or ten years.

"13. Requiring sworn statements, in addition to customary manifests and clearances, by masters of vessels sailing during a war in which the United States is neutral.

"14. Providing for the issuance of search-warrants and the seizure and detention of property thereunder."

REPORT OF NAVY YARD COMMISSION.—The commission on navy yards and naval stations, of which Rear Admiral J. M. Helm, U. S. Navy, is the senior member, has issued two reports since its preliminary one was made public, the latest one relating to submarine and aviation bases on the Pacific Coast. The commission reports that it is advisable to establish a submarine training base at Los Angeles Harbor in Southern California, and that provision should be made for a permanent training base for at least 18 submarines as well as for an operating base for the use of submarines in time of war, the site selected being located "at the existing naval reserva-

tion, between the north end and the quarantine station." It is recommended that this section of the reservation and as much more as may hereafter prove necessary be reserved for this purpose. The commission recommends the insertion of the following proviso in the current naval appropriation bill in this connection:

"That the Secretary of the Navy is hereby authorized to accept a tract of land comprising 166 acres, more or less, of submerged land in Los Angeles Harbor known as Site No. 1, which has been offered to the United States free of cost by the city of Los Angeles, for the purpose of establishing thereon a submarine base, and for such other uses by the Navy Department as may hereafter seem desirable for the purpose of national defence, and the sum of $300,000 is hereby appropriated towards the development of same, and made immediately available."

The commission also recommends similar legislation with an appropriation of $500,000 for the establishment of a naval aviation base on San Diego Bay that should be used as an operating base in time of war.

In its preceding report the commission called attention to the grave lack of navy yard facilities on the Pacific Coast and recommended the establishment of an additional navy yard or naval station on that coast. It also recommends that the capacity of the Pacific Coast yards "for maintenance and repair of the fleet" should be trebled, and that for strategic reasons it is necessary "to have at least two navy yards of the first class on the Pacific Coast of the United States." In view of the natural limitations of the navy yard at Mare Island an additional yard on San Francisco Bay is recommended, the four sites named as possibilities being Hunter's Point, Alameda, Goat Island and Richmond-Albany. Recommendation is also made for the development of the navy yard, Puget Sound.

The report continues: "The commission is deeply impressed with the impracticability of providing at Pacific Coast navy yards, without prohibitive expenditures for original establishment and subsequent annual maintenance, adequate provision for the main fleet, its regular auxiliaries, and the additions consequent upon war operations when the fleet and its auxiliaries are operating on the Pacific Coast. For this reason, commercial resources must be drawn upon to the fullest extent possible. In order that such resources may be available when needed, it is important to aid and encourage their development, in every suitable and appropriate way, so that shipbuilding, docking, repair, supply, and other facilities necessary to the fleet may be at hand when most needed."

The commission recommends the following appropriations be made for the fiscal year ending June 30, 1918: Towards acquisition and development of site for additional navy yards on San Francisco Bay, $1,500,000; towards development of navy yard, Mare Island, $2,250,000; towards development navy yard, Puget Sound, $2,500,000.

In addition to Admiral Helm the commission includes: Chief Constructor W. L. Capps, U. S. N.; Civil Engineer H. H. Rousseau, U. S. N.; Captain G. W. McElroy, U. S. N., and Commander C. L. Hussey, U. S. N.—*Army and Navy Journal*, 16/2.

COASTAL AERONAUTIC STATIONS PROPOSED.—A joint army-navy board is studying the Atlantic and Gulf coasts preparatory to the establishment of eight aeronautic stations, which, besides having two dirigibles and six or eight seaplanes each for aerial patrol work, probably will serve as bases for the new 110-foot coast scout boats of which the navy will order more than a hundred in a few days.

Sixteen dirigibles and a sufficient number of seaplanes already have been contracted for, and officers and men for the air service are being selected to be sent to the station at Pensacola, Fla., for training. A school dirigible for the station is about ready for delivery.

The eight stations will be distributed along the coasts to cover strategic areas to be determined by the board. Each will require six officers and 40 men.

The only station site already definitely selected is that at Coco Solo, near Colon, Canal Zone, for which an appropriation of $1,000,000 to establish a joint aviation and submarine base was asked of the last Congress. The project is expected to go through at the coming special session. Funds for the other stations also will be asked at that time, but the department has emergency appropriations sufficient to begin the work at once. The dirigibles are to be delivered within four months.

At present no stations for the Pacific Coast are being prepared, although the chain of coast patrol bases will be extended along the entire coast line as rapidly as machines can be procured and men trained.

The immediate scheme requires the training within the next four months of 50 officers and 350 men at Pensacola in handling dirigibles. Crews for the seaplanes are already under training, but their number must be increased largely without delay.

In providing boats to aid in the task of guarding the coasts, navy experts would prefer a standard type 130-foot steel boat for patrol and submarine chasing work, but in the interest of speedy construction has determined on the 110-foot craft, with wooden hulls, so that builders of wooden boats can share in the work. Later orders will be placed for some small submarine chasers ranging from 50 to 85 feet in length.—*New York Herald.*

NEW NAVAL SUBMARINE BASE.—The naval authorities have amended their plan of last year for two submarine bases, one at Colon and the other at Panama, on the Canal Zone, one for 20 boats and the other for 10. Now it has been decided to have only one base, covering both coasts, with 20 boats in all. This is the result of the conclusions of the naval board and the joint army and navy board. The U. S. S. *Charleston,* which has been serving as a mother ship for the submarines in that quarter, has been withdrawn on account of the mobilization plans. There are five submarines there now, and these with the seven *N* boats to be sent there shortly and the *O* boats as soon as delivered will bring the number up to 20. This is in the line of the recommendation of the joint board, a report from which body says:

"Submarines are an essential element of the defence of the Canal Zone and the canal itself. In their present stage of development they constitute such a threat that close blockade is recognized to be impracticable in this day, and that alone would suffice to justify their inclusion in the scheme of defence. They have, however, another sphere of usefulness in their ability to carry a threat against a superior force to a distance. They thus supplement the fixed defences, render any approach of a hostile expedition hazardous, and their presence would tend to throw hostile landings farther away from the terminals of the canal than any fixed or mobile forces on land possibly could, even if they did not serve to prevent a determined enemy from landing or otherwise attacking the canal. It is the opinion of the joint board that submarine shore bases are a necessity at the Panama Canal. The joint board further recommends that appropriations be sought to build up the submarine bases at the isthmus at the earliest practicable date."—*Army and Navy Register,* 24/2.

SURGICAL SUPPLIES IN WAR TIME.—A meeting of the Council of National Defence was held February 12 for the further consideration of the industrial mobilization of the country for use in an emergency and take up the offers made by manufacturing and commercial establishments to turn their plants over to the government in the event of war.

Both the War and Navy departments have received many such offers. This statement was issued by the War Department regarding the meeting of the council:

"This call is not based upon any new incident in the international situation; but, as the organization of the industry and commerce of the country for rapid use in time of emergency is the primary purpose of the council,

it is thought that these patriotic and numerous voluntary offers afford an especially favorable opportunity for beginning the work of organization and carrying it into speedy execution."

The council also made public the personnel, scheme of organization, and the program for the immediate future of the newly formed committee on standardization of medical and surgical supplies. Two weeks ago Newton D. Baker, Secretary of War, as chairman of the council, after consultation with Dr. Franklin Martin, of the advisory commission to the council, issued an invitation to Secretary Daniels as head of the naval bureau of medicine and surgery, to Secretary McAdoo as having jurisdiction over the Public Health Service, and to the medical division of the Council of National Defence, asking them to make nominations for membership on the committee on standardization of medical and surgical supplies.

The committee was named as follows:

Dr. George W. Crile, Cleveland, Ohio, professor of clinic surgery, Western Reserve University, and surgeon Lakeside Hospital.

Dr. Harvey Cushing, professor of surgery, Harvard University, and chief surgeon of the Peter Bent Brigham Hospital, Boston.

Lieutenant Colonel Carl R. Darnall, U. S. Army, medical corps.

Dr. Carl L. Gibson, adjunct professor of surgery, Cornell University Medical College, and surgeon New York Hospital.

Dr. Richard H. Harts, surgeon to Pennsylvania and Orthopœdic hospitals, Philadelphia.

Colonel Jefferson R. Kean, director of military relief, American National Red Cross.

Dr. Joseph A. Murphy, surgeon, bureau of medicine and surgery, Navy Department.

Dr. Henry S. Plummer, the Male Clinic, Rochester, Minn.

Dr. T. W. Richards, American National Red Cross.

General K. C. Rucker, assistant surgeon general, U. S. Public Health Service.

Dr. Frank F. Simpson, chief of medical division, Council of National Defence.

The committee on standardization met in Washington on February 12. The purpose was to formulate plans by which standardization of all medical and surgical equipment in the country can be effected. Subcommittees will be appointed to represent every branch of medicine and report regarding articles which they deem essential to the successful conduct of their work. These various reports will be collated with the idea of standardizing supplies needed for the governmental departments of medicine on one hand and for civilian activities on the other.

The objects of the proposed standardization are: To make it possible to obtain surgical supplies in large volume on short notice; to have definite specifications so that manufacturers of similar articles may divert their activities with a minimum of delay or inconvenience to the production of supplies required by the Army and Navy; to reduce cost by enabling manufacturers to produce the various articles in quantity, and to enable civilian practitioners to become familiar with the instruments and appliances which they will be expected to use if they are called to the colors. —*Army and Navy Register.*

NAVY SHELL CONTRACTS.—The Secretary of the Navy announced on February 19 that contracts had been awarded to domestic concerns for the manufacture of more than 14,000 shells of the 14-inch armor-piercing type. These contracts are to supply the shells for which Hadfields, Ltd., an English firm, had underbid American munition makers by almost $200 a shell. After the Department had announced that the contract would be placed with Hadfields, Ltd., Ambassador Page, in London, was notified that the British Government would not permit the filling of the

order "under present conditions." The contracts awarded on February 19 were as follows:

Crucible Steel Company, 5000 14-inch armor-piercing projectiles at $500 each; Midvale Steel Company, 5000 14-inch armor-piercing projectiles at $500 each; Washington Steel and Ordnance Company, 4200 14-inch armor-piercing projectiles at $500 each.

The total amount involved is $7,100,000, or according to Secretary Daniels about $447,000 less than would have been the case if the contracts had been awarded at the prices submitted by the above firms on January 3.

In the case of the 16-inch shells, no bids were received to take over the contract which had been tentatively awarded Hadfields. This was for 3000 shells to be delivered in 16 months at $513 each. The next bidder (Washington Steel and Ordnance Company) wanted 32 months in which to finish 2500 shells at $750 each. No immediate need is foreseen for these larger shells as the navy has not at this time, and will not have for at least two years, any guns requiring so large a projectile. It is learned that no anxiety is felt on this score, also, in view of the fact that the Department expects to have the government projectile factory in operation within a year. If the domestic manufacturers continue to find themselves unable to bid on the 16-inch shell, this factory could easily be set at work on just that type of munition.

The reduction in the bids of the American concerns on the 14-inch shells was effected after several conferences between representatives of those concerns and Navy Department officials. In every case, it is understood, the manufacturers expressed themselves as very anxious to do everything to assist the government, even to taking the contract at a figure which represented an actual financial loss.

Great Britain has withdrawn her objection and made known her permission for Hadfields, Ltd., to contract with the United States Navy for armor-piercing shells of the 14- and 16-inch type.—*Army and Navy Journal.*

SUBMARINE NET AT HAMPTON ROADS.—Rear Admiral Walter McLean, United States Navy, commandant of the navy yard at Norfolk, Va., issued a warning to mariners on February 16, that a big steel net such as Great Britain has used as a guard against submarines was being placed in position at the entrance to Hampton Roads. The net's position is indicated by a line of buoys, on which searchlights will be trained at night. In his warning Admiral McLean instructed masters and pilots of merchant craft not to approach the buoys without first signalling the boat on duty for orders. Nets have also been placed at Guantanamo harbor, the Narrows at New York, and other places, and provision has been made for the placing of nets at other important points, according to unofficial report. Ships are barred from entering or leaving port at night, where nets have been permanently fixed.

Further official confirmation of the numerous press reports as to "an immense submarine net" stretched across Hampton Roads, Va., came from the War Department on February 20, in the shape of the following memorandum:

"The efficiency shown in the rapid construction and planting of the submarine net which now closes Hampton Roads is a matter of satisfaction to the War Department. This net, which is considerably over a mile long, and in places nearly 60 feet deep, was built and planted by the coast artillery troops at Fort Monroe, Va. Swinging sections, or gates, are provided, to permit the passage of shipping, which is convoyed through the net by naval vessels."

The net, it is learned, is constructed of wire rope of about the thickness of an ordinary lead pencil, with meshes 12 by 15 feet square. On the top of the net are floats, while weights attached to the lowest meshes serve to keep it upright in the water. The slightest disturbance to the net is communicated to the floats on the surface, and the men assigned to watch the contrivance can immediately investigate at that point. The chances

of a submarine getting through or, in fact, of touching the net without becoming hopelessly entangled, are practically nil. Once "caught," the floats inexorably follow to point out the position of the enemy to the swift destroyers. It is the opinion of army officers that the use of nets similar to that described above has enabled Great Britain to maintain so effectively her stream of supplies across the English Channel, the Channel being sufficiently narrow and shallow to permit the use of nets for its entire breadth.

The first "fish" entrapped by the net at Hampton Roads was the peaceful Old Dominion Line steamer *Madison*. On the night of February 19 her propeller became entangled in the net, and it was only after more than 12 hours' hard work that she was freed. The steamer was bound at the time for New York with passengers and cargo.—*Army and Navy Journal.*

UNITED STATES NAVAL MILITIA AND NAVAL RESERVE

PATROL FLEET EXPLAINED BY REAR ADMIRAL USHER.—Read Admiral Nathaniel R. Usher, commandant of the New York Navy Yard, issued a comprehensive statement explanatory of the task of mobilizing the patrol fleet which will guard New York harbor surrounding waters and the Atlantic coast in what is known as the third naval district, extending from New London, Conn., to Barnegat, N. J. Rear Admiral Usher also is commandant of this naval district.

The statement urges immediate enrolment in the United States Naval Reserve force, authorized last summer, and announced that arrangements now are being made for an enrolling officer to spend one day a week at each of the towns and harbors along the Atlantic coast.

Rear Admiral Usher's statement follows:

"The naval defences, which are additional to and supplement the activities of the regular navy, consist of harbor defence vessels, monitors, armed merchant vessels for off shore scouting, large power boats for patrol work along the coast, and smaller power boats for inland waters and for use at the mouth of the harbors and tugs for mine laying and mine sweeping.

"The vessels of the coast guard will form part of these forces, and the lighthouse tenders also will be employed in connection with the laying of mines and handling of nets.

"The communications are taken care of by the radio stations under control of the government; all of which will be under the control of the Navy Department, and the coast guard and the life saving stations will be under the commandant of the district, and will be available for keeping a lookout along the coast.

"As all of the above vessels except the coast guard and lighthouse vessels will be officered and manned by the United States Naval Reserve Force, almost none of the naval officers or men of the regular navy will be available, as the battleship fleet and regular navy will require their services.

"The naval militia or state naval forces will reinforce the crews of the ships of the regular navy; therefore, few of them will be available for the naval district defences.

"The above named coast defence vessels and tugs and patrol boats will, therefore, be manned by the United States Naval Reserve Force, which was authorized by an act of Congress last August. This force is being enrolled and consists of officers and crews of merchant vessels, and of owners, officers and crews of power boats, yachts, fishing vessels and work boats.

"Many competent officers and men have already enrolled, but to man the number of vessels planned it will require many others, especially engineers, quartermasters, firemen and sailors for small vessels, power boats, yachts, tugs, etc.

"Steps have been taken to reach these men through the various maritime organizations, clubs and societies, etc., and it is particularly desired at this time to have local agents in the various harbors and towns along the coast line who will collect the names of men who are willing to enroll and communicate with the commandant of the district.

"Arrangements will be made to send out full information to these agents (as has already been given to the above-mentioned societies) in regard to the United States Naval Reserve Force.

"Enrollments can be made now at the Brooklyn navy yard, and within a week at the New York office, where all applicants will receive full information.

"Plans are being made for a travelling enrolling officer to visit the different towns and harbors along the coast line, spending one day per week at each place for the purpose of enrolling those who have signified their willingness.

"It should be especially stated that men who enroll in class 4 of the naval coast defence reserve and will serve only on above vessels or at local shore stations are not to be drafted into the regular navy.

"They are not subject to call except in time of war and will not be called to do duty on the Mexican border or any similar duty. It is the Navy Department's intention that the officers and crews of class 4 naval reserve shall be employed as far as possible on those boats that they have previously served on and they will also be employed on boats assigned to their own neighborhood, that is to say men recruiting on the south side of Lond Island will be given duty on boats in that district as far as possible; men recruited on Long Island Sound will be given duty if possible on boats in Long Island Sound.

"The United States Naval Reserve force consists of the following classes:

"Class 1. Fleet naval reserve, composed of one-time regular navy men.

"Class 2. Naval reserve. Any seafaring men and officers for general naval service under 35 years of age.

"Class 3. Auxiliary naval reserve. Officers and crew of merchant vessels which may be purchased or chartered for naval use.

"Class 4. Naval coast defence reserve. Officers and crews for vessels for local coast defence mentioned above and local shore stations.

For the latter class are desired men familiar with power boats, fishing vessels, tugs and seagoing vessels.

"There are also wanted officers and men for technical and administrative work on shore and naval bases.

"Men are enrolled for four years, but in time of peace they may resign at any time. To be confirmed in their rank or rating they must have three months training. They may have continuous active duty on full pay if they desire it, and their services are needed. After three months' training and confirmation, officers and men receive a retainer every year, of two months full pay without performing any service except three weeks annual training. Before being confirmed they receive an annual retainer of $12.

"Men may enroll in any naval district they choose. Many owners and crews of vessels enroll and wish to serve aboard their own boats. It is the intention of the Navy Department to assign such men to localities and boats with which they are familiar."—*New York Herald.*

NAVAL RESERVE FORCE.—Very satisfactory progress is being made toward the creation of the personnel of the naval reserve force authorized by the naval appropriation act of August 29. The fleet naval reserve now consists of more than 1000 members, the increase being at the rate of about 100 a week. In class 2 of the reserve there are about 200 seagoing members. Class 3, devoted to auxiliary ships, is made up of men connected with 105 vessels which have been listed by the Navy Department, and enrollments of the personnel is being conducted as rapidly as possible.

Class 4, the coast-defence naval reserve, has 1000 members, and by the end of the month there will be five times that number. The reserve flying corps possesses but one member at this time, Ensign Mark L. Sperry, Jr., attached to the U. S. S. *Wyoming*. About 180 men and six officers from ships on the Great Lakes are now with the Atlantic fleet on the winter cruise and will stay with the fleet until the 1st of March or, in the case of those who desire to do so, until the fleet comes north; in case of war, of course, all of these men will remain with the fleet. All the naval districts have been organized for enrollment, and the work in that direction is progressing with celerity. In the event of war it is expected that there will be many enrollments in the naval reserve, and in such cases the period of service will be for the war, separation from service being automatic on the termination of hostilities. This will be accomplished without resort to new legislation and to that extent constitutes an improvement over former conditions. A flag has been adopted for the naval reserve force. Its design is that of the device used on officers' caps, an eagle and shield on crossed anchors. The body of the flag is blue, the eagle and anchors are white, and the shield is red and white. This flag will be flown at the mainmast of those ships which have been listed by the Navy Department and commanded by officers of the naval reserve force. —*Army and Navy Register*, 17/2.

TO MOBILIZE YOUTH FOR NAVAL SERVICE.—The youth of the country is to be mobilized for naval duty and 2000 are to be recruited in this city. This was decided March 13 at a meeting in the Astor Hotel which was attended by several men interested in the United States Junior Naval reserve. Boys between 14 and 17 years old, in the event of mobilization of all the naval forces, will act as messengers in the navy yards, arsenals and government munition plants. The older boys be detailed for gunnery work and signalling duty on board the vessels of the mosquito fleet.

Dr. William T. Hornaday is president of the organization and Perry Belmont is vice-president. The latter was said to be in Washington arranging further details for the mobilization. Through the recruiting station opened two weeks ago at No. 231 West Fifty-eighth street, 250 boys already have been enrolled. Another station will be opened this week in Brooklyn. Among those present at the meeting were Lieutenant Richard P. McCullough, United States Navy, and Lieutenant Ernest D. McWhorter, United States Navy.—*New York Herald*.

CALIFORNIA NAVAL RESERVES ACTIVE.—The Los Angeles Naval Militia recently issued a call for volunteers as follows:

"This is an hour of immediate and increasing danger to the United States when every patriot must weigh in his own mind and conscience the full duty he owes to his nation, in time of war.

"That duty is to prepare. Each man, be ready.

"The world is aflame with war. Hatred, aggravated by envy of our peace and prosperity, is leveled upon this nation from all directions. Intrigues, based upon the lust to conquer and to oppress, are insidiously working to send at our throats peoples from whom we think we are entitled to gratitude, friendship and respect.

"This nation will not strike the first blow in any war. When that blow falls—if it falls—it will come upon us like a meteor from the firmament, without warning. Our most prosperous, our most beautiful, our most precious territory will be the target for the first ravages. There is a man, to-day, drilling and training, whose attack, behind some terrible engine of war, may already be planned and even under way.

"Would you avoid war?" Then let it be known that for every such attack that may be launched against us we are ready to stand—ship for ship, gun for gun, and man for man.

"*Patriotic Citizen.*—When your country needs you, in the moment of bitterest peril, can you be 'the man behind the gun,' ready to fight, trained to fight, accustomed to the use of arms and defences? Your choice is single—Be ready, or resign yourself to be herded like sheep in training camps, or, more likely, be seized by a triumphant invader and become his serf.

"You can make this single choice now, to-day. You cannot make the choice after war is upon us.

"*Mothers, Wives, Daughters.*—Remember the women and the babies of Belgium and of Poland. Urge your brothers, your sons and your husbands to do their full duty to you, to their homes and families and be prepared to protect against the worst horrors the human imagination can depict.

"The naval forces of California are our first line of defence. Our dangers lie by sea. If our navy is strong enough and prepared enough it may prevent any attack by any foe.

"The United States Navy needs, immediately, to man the ships that are ready for service, 100,000 trained men. Every man who wants to serve his country must be training now.

"The naval militia of the state of California offers to the young men of Los Angeles County the opportunity to secure this training at the minimum sacrifice of time or money.

"The state of California has provided the armory and the equipment for so much of the drills and training as can be done on shore.

"The United States Navy keeps in Los Angeles harbor available for the use and training of the naval militia warships, destroyers, torpedo-boats and submarines. Almost any Sunday, members and squads of the militia can and do train or practice upon a ship of the navy.

"The United States Navy furnishes every summer to all members of the naval militia enlisted before April 1, a battleship for a cruise of three weeks, in which the drilling and training of the year may be perfected in actual application with the latest fighting machinery.

"The state of California and the United States Navy furnish to the ambitious every opportunity for study and advancement in any line of the service. It is possible for a young man to enter the naval militia, perfect himself in his drill, pursue technical study and training and perfect himself to assume the duties of a warrant officer or even a commissioned officer in the navy. And all this entirely without expense to him.

"The Practical Patriots' League has assembled the funds to pay members of the naval militia in Los Angeles for the time they spend in drills, cruises and organized preparatory work. The same league is assembling a guarantee fund, available in case of war, so that when a man is called to the colors he may go to his country's service secure in the knowledge that his responsibilities to his family and dependents will fall upon the shoulders of the man behind the man behind the gun.

"If no war comes, you will be the gainer by this patriotic preparation. If war does come, you will be able to offer your nation something worth giving—the services of a man who is trained.

"*Volunteers.*—Present yourselves at the armory, at Exposition park, Thursday evening March 8, 7.30 o'clock—the regular drill night of the naval reserve. See the work, choose your division or section and enroll. Your country needs you. Age limit, 18 to 45 years."

A "Practical Patriots' League" has been organized in Los Angeles with the objects of increasing the naval militia, and providing funds to be used in training and in supporting dependents in case of war. At the first meeting of the league, held March 7, with Mr. E. L. Doheney presiding, about $110,000 was contributed by members.

Los Angeles motor-boat owners are organizing for patrol duty.

PLANS POWER BOAT TUITION.—The United States Power Squadron Association, following an all-day session March 5, took action to place its resources, comprising 20 squadron units in the principal Atlantic and Great Lakes ports of the country, at the disposal of the government. Owing to the fact that of the thousands of motor boats owned in the United States comparatively few are of sufficient size and power to be used in operations against submarines, the association decided to place the hundreds of vessels represented in its fleets at the command of the Navy Department, to be used as training vessels for personnel while the larger craft are being built.

The proposition to utilize the motor-boat fleets for training purposes was transmitted to Assistant Secretary of the Navy Roosevelt by Theodore I. Coe, head of the Power Squadrons Association. The plan, as submitted to Mr. Roosevelt, is described in part as follows:

"In each city where a power squadron unit exists, instruction classes will be immediately formed for teaching all the things pertaining to seamanship and coastwise navigation. These instruction meetings will be held several nights a week, and will be open to every one who cares to attend. An effort will be made to reach the young men of all classes.

"After the theoretical training in the classrooms, and as soon as the boats owned by the members of the power squadrons can be put into commission, the training will be transferred to the boats. Men who perhaps never have been aboard a power boat before will be taken on the water and given a chance to learn seamanship and simple navigation.

"During all of the training the men will be under no obligation to join the United States Power Squadrons unless they see fit. The one object will be to assist the Navy Department, encourage enrollment in the naval coast defence reserve, and to train men. The training of the men will come under the supervision of the existing Central Committee on Instruction of the United States Power Squadrons. This committee consists of H. A. Jackson, New York; Dr. A. B. Bennett, Washington, and C. F. Chapman, New York."

The men who have been put in charge in the various districts are C. N. Burnall for Boston, H. M. Williams for New York, Dr. E. P. Sweet for Providence, J. K. Murphy for New Haven, L. P. Clephane for Washington, H. H. Hungerford for Chicago, and Maurice G. Belknap for Philadelphia.—*New York Times.*

THE UNITED FRUIT COMPANY'S FLEET.—It is news of welcome significance that the United Fruit Company has recently placed an order with the Harlan & Hollingsworth Corporation for four passenger and freight vessels of notable tonnage and speed for the company's regular services between the Caribbean region and Atlantic ports of the United States.

During many years the United Fruit Company, though of thorough-going American management, has procured nearly all of its steamers from yards of the United Kingdom, where they could be built at a lower cost than in this country. The war, of course, for the time being has equalized conditions in this respect, and, indeed, has now left only American yards available. But the appearance of large American-built steamers in the United Fruit fleet may well prove to be the beginning of agreeable relations which will lead to a constant use of American yards hereafter—as has been the experience of the Ward Line to the West Indies and Mexico (the well-known New York and Cuba Mail Company), most of whose ships have been of native construction.

Most valuable to the United States of all the new accessions which the war has brought is the fleet of about 30 steamers flying the United Fruit flag which have been transferred from British to American registry under the emergency act of August 18, 1914. This "White Fleet" is a credit to the Stars and Stripes flying at the taffrail. Most of these steamers are of more than ordinary speed, and all are admirably equipped and maintained in fine condition. They represent a genuine addition to the naval reserve of the United States.—*Marine Journal.*

ADMIRAL EDWARDS ON PREPAREDNESS.—On February 22 Rear Admiral Edwards delivered an address at Bristol, R. I., which we reprint from the *Bristol Phœnix*, as follows:

"Admiral Edwards began by giving an outline of a famous play named 'Milestones,' that had a long run some years ago in London, and that served to arouse the English people to a knowledge that something was wrong with the empire, and that really made possible the leadership of David Lloyd George. After telling how Great Britain at last took note of the warnings on the milestones of her progress, Admiral Edwards spoke of our own land as follows:

"'And all this time America, apparently peaceful and prosperous, regarded herself as a nation triumphant, when, in fact, she was the one power that should have been contemplant instead of exultant. We should have realized that our own plight as regards national defence was even worse than that of England, since shadow after shadow of coming events ought to have been observed and served as a warning that we should place our own house in order. In our self-complacency and prosperity we considered that the possibility of our becoming involved in this war was but little less remote than a conflict with Canada. We contracted, however, for a few aeroplanes when France and Germany were experimenting with hundreds of such appliances. Each year a few submarines and destroyers were authorized, while our possible foes were building such craft by the dozens. We built battleships and yet failed to develop the naval stations that were expected to repair them. At over half of our naval stations we did not possess a crane with sufficient hoist, reach and capacity to handle the boilers, turrets, or guns of a modern battleship. Even where coastwise guns were mounted we failed in some cases to provide a full complement of men for their maintenance and operation.

"'The patriotism and integrity of our shipbuilders were impeached, and therefore the industry was discredited. It was the one industry of all others that should have received national encouragement and assistance, for the possession of an extensive merchant marine is but one remove in importance to national defence to the development of a powerful fleet.

"'There were so few urging national preparedness that in the years 1908, 1909, 1910 and 1911, only two battleships were authorized during each of those years. In 1912, as well as in 1913, but a single capital ship was authorized. In 1914, three battleships were authorized, but it must be remembered that we had then sold to Greece the second-class battleships *Mississippi* and *Idaho*, and therefore two of the three capital ships obtained that year were but simply replacements of those that we had lost by sale.

"'The apathy of this nation to military affairs for the past ten years has been simply surprising, and therefore our relative military strength has been regarded as negligible. Our indifference to the admiration and esteem of the other nations of the world can only be termed humiliating and appalling, for even during the past two years, when nations have been fighting for their very existence, some of our manufacturers have discredited their own country by the unscrupulous manner in which they have attempted to foist inferior supplies and machines in lieu of the superior appliances that were called for. In certain quarters of Europe we are looked upon as absolutely without conscience by reason of the manner in which we have subordinated our self-respect to financial gain.

"'During the past year, however, America has been aroused at least in part to not only her military weakness, but to her impaired honor and standing. Measured from the standpoint of national defence, we are commencing to make an inventory of our military assets, and therefore we are procuring stores and implements that should have been purchased years ago. We are rapidly awakening from the happy dream that only a glorious Trafalgar awaits our fleet when it meets an opposing force; and an army that was recruited over night could meet our military needs.

"'Our real national weakness, however, is founded upon other causes than lack of an adequate army and a suitable sized fleet. We are keen in wearing flags, buttons, and rosettes representing the national colors, but we appear to forget that courage in a worthy cause means, if necessary, the shedding of blood, and that the color red is the symbol of courage. Our youth dream, that if they had lived centuries ago they would have striven to have been knights at Arthur's Court, and yet they forget that the best of his knights spent most of their time beyond, rather than within the castle walls, and that King Arthur measured the courage and manhood of his knights by the number of wrongs they had redressed, rather than by the garb in which they appeared at court, by the prizes they won at the tournaments, or by the minstrels they sang to the maidens of the realm.

"The great nations have ever been those in which people were ready to render to the state some distinct service that represented personal sacrifice. Personal sacrifice is something more than verbal utterance, or the contributing of a pittance for some worthy cause connected with military affairs.

"That nation will perish, which will not, at least upon its national holidays give its best thoughts to the uplift and betterment of the nation. Of all our national holidays, the birthdays of Lincoln and Washington ought to be the most appropriate ones when we should take measure of existing national thought and purpose, for among the highest tributes that will ever be paid to America will be that it produced a soldier and statesman like Washington, and an emancipator and an overshadowing majestic figure like Lincoln.

"If this country is to maintain a high place among the nations of the earth and to fulfill the great mission contemplated by the framers of the constitution, then it is our bounden duty to more closely study the life and character of both Washington and Lincoln and to note if our existing standard of honor and action would appeal to these leaders—the greatest that we have produced. If we believe the teachings of the Bible, then we must believe that there are times when the spirits of these men hover near us, and that if we are receptive for counsel, then in some mysterious yet unmistakable way, there will come to us not only warning of impending danger, but means of guiding us to ways that not only make for peace, but for honor.

"Surely the thought must have forcibly and repeatedly come to this nation during the past two years that all is not well with us, and that we lack at least to some extent, the virile qualities that prompted us in past generations to fight for the persecuted and oppressed. Would not Lincoln, as well as Washington show, by their saddened expressions if they appeared to us in a vision, that however much America may have advanced as regards benevolence, generosity, inventive talent, internal development, business capacity, unselfish philanthropy, and material wealth, and that even though we are still the most favored and ought to be the happiest nation in the world, that we have retrograded along certain distinct lines?

"Has not President Hibben of Princeton University expressed the duty of America when he calls for a revival of national spirit, for devotion to duty rather than reliance upon service, and for the spirit of self-sacrifice, if need be, for national safety and honor. And then he states that although we have coined money in fabulous amounts out of this war, even New Zealand has been more liberal to Belgium than we.

"If this nation ever accepts the doctrine that another power shall tell the United States just how we shall mark our ships, just where these vessels shall go otherwise than as we desire, and that the freedom of the seas will be denied us, then it is about time we questioned ourselves as to whether our national emblem means anything to us. The answer will be found in the words of Doctor Hibben, who says:

"We do not want to become involved in war; we do not want to fight. But we should have the spirit of being willing to fight rather than

to sacrifice our national honor. Our fathers struggled heroically for the cause of liberty, not merely that America might be a land of liberty, but that the idea of liberty might be given to all nations of the earth.

"We must show by our deeds that we prize honor above comfort, justice above gain, and mercy above justice, and that we would gladly lay down our lives rather than, by living to ourselves in peace and prosperity, prove false to God and man."

"We, of all other countries, should be the last to engage in lamentations and miseries, for I believe that this nation is yet the best land to live in and that it offers greater possibilities than any other to the betterment of mankind. All may not be well with us, but all is not wrong. We must, however, manifest American manhood and spirit at its highest and best, to maintain even our own self-respect. We have already endured much to maintain peace, but the time has now arrived when we should make our flag respected on every sea where we have the right to trade, and by taking such action, assume our real place among the nations of the earth.

"We owe it to the weaker republics of America if not to ourselves to prepare for war, and we should let it be unequivocably known that if we are ever forced into war we will not sheathe the sword until our foe has been made to meet the fate that was intended for us.

"We should now recognize the fact in its fullness, that we have distinctly retrograded as a nation in certain important respects, because we have been so bent upon filling our purses that we have neglected to maintain our manhood. This nation has simply lost all sense of perspective if we have failed to observe certain 'Milestones' that show our national short-comings. Who can deny that we are weak along the following lines:

"The lack of national spirit is so manifest that one can almost say truly that until two years ago it was not in good form in every section of the country to be sincerely enthusiastic as regards love of country. We should ere this have developed national airs that would have reflected the best spirit of America. We have not, in fact, a national hymn which can be sung by our people—a hymn which arouses that patriotism and inspiration which comes from hearing such airs as the 'Marseillase' or 'Eine Feste Burg.'

"'There are but few agencies of the land that are doing systematic and continuous work in developing and maintaining patriotism, and in all sincerity I believe that the most powerful and influential factor that is engaged in this far-reaching purpose is your own splendid organization—the Daughters of the American Revolution. In past years, the Grand Army of the Republic has done invaluable service along this line, but that organization would ere this have been substantially disbanded if it had not been for the patriotic and untiring energy and inspiration of its Women's Relief Corps. Even the uniform of the army and the navy is discredited in certain quarters, for from time to time we read that some judicial officer has disgraced himself and impeached the honor of his country by informing self-confessed or convicted criminals that deserved jail sentences meted out to them would be remitted in case they enlisted in some branch of the military service.

Patriotism will never become a national virtue unless it is instilled in the child at home, and the revival if not the survival of the highest spirit of America is therefore dependent upon the action of the mothers of this land. One central and most effective agency that can render far-reaching service in this special direction is your own organization, for it is recognized that it is a distinction to be entitled to wear your badge and insignia for it was your society that did the pioneer work in the renaissance of patriotism.

Even in the Far East to whose countries we send missionaries and whose people we term heathen, the lack of discipline and respect for age upon the part of our children excites surprise and even indignation. The nations that have survived the longest, and the children who are the happiest, are those who honor age and heed the counsel of their parents.

That nation is on the decline where the children rule the home, and where their wishes and desires predominate over the judgment of their elders. Something must be done and done quickly to subject the youth of American to yield due respect to the experience and judgment of their teachers and parents.

Probably one of the most promising measures that has yet been inaugurated for inculcating discipline in youth of America is the contemplated establishment throughout the country during the coming summer of junior military camps, for the military training of boys between the ages of 15 and 18 years. The organization and administration of these camps are to be absolutely under the direction of commissioned officers of the United States Army. During the coming summer it is desired to have at least 25,000 boys under training in these camps, and Bristol should send at least a dozen such volunteers. There will be a camp of this character at Portland, Maine, and another on Plum Island, near New London, and the only expense attached to entering these camps will be the actual cost of subsistence together with necessary clothing and traveling expenses.

"The mothers of America have a very direct interest in these camps, for it may ultimately mean the life of your son as well as the development of his manhood to have him volunteer for such duty and to have him receive training that may conserve his life and health. The soldier that has little to fear from typhoid camps, and the man that can be relied upon to develop rather than to impair his character and manhood under the demoralizing conditions of war, is the man who when a boy, had been subjected to discipline, who realizes the import of obedience, and who had been unequivocally told as to the resultant of vice and dissipation. And this is what will be told to your boys at the projected junior training camps.

"There are in America thousands of men who are making the nation's necessity their individual opportunity. Such men appear to have no conception of the fact that in rendering service to the state, one should be willing to make sacrifices, rather than to look only for profit and gain. It should be regarded as bordering upon treason for any citizen to deliberately furnish defective supplies or munitions for an army in the field or for the fleet, and the Congress should therefore enact such drastic legislation as would place a felon's garb upon every one directly responsible for such action.

"There are of course 'lean' years in the life of every industry, and every manufacturer ought have the right and prerogative in prosperous times to make sufficient profit to cover the loss of these lean periods. Willful fraud, however, in the manufacture of supplies for the troops in the trenches should not be condoned, and where it likewise appears as if inordinate profits had been exacted in the manufacture of munitions of war, the government should either commandeer such plants or else put a heavy sur-charge tax upon dividends that are unduly excessive. With a reasonable legal limit as to the extent of profit that would be permitted upon manufacture of war material, there would be decreased temptation to turn out an unsatisfactory output, and for this reason if for no other, the government should take effective means in preventing its necessity and peril from being utilized by manufacturers in demanding profits that are almost staggering in amount.

"Personally, I believe that the man who is keeping another on the firing line is rendering valuable military service, for every belligerent in the present war has found out that it was a blunder to take into the army men who would have been much more useful to the nation had they remained at home working at their ordinary trades or directing the operations of great industrial establishments. Both Great Britain and Germany have found that the ablest ministers of munitions were those who had experience as captains of industries rather than those whose training had been in command of troops.

"Every nation is justified in time of war in enacting measures that will prevent any man from becoming a millionaire in supplying the military needs of the country. If necessary, our captains of industry as well as our greatest technical experts, should be drafted into the public service if they will not volunteer for such duty. The highest honors of the Republic should likewise be paid those who put conscience and patriotism into meeting the military necessities of their country. Where national spirit, however, is lacking upon the part of the individual, and wherever there is an attempt to reap inordinate gain at the expense of the families of the men in the trenches or those on the fleet's battleline, there ought to be assembled a military court to deal with such cases, for such overcharge should be placed in the category of furnishing aid to the enemy.

"The distinguishing and overshadowing weakness of America is our lack in national leadership. We have, of course, able men and prominent personages in public life, but few overtopping leaders. The inordinate desire if not craze for wealth to meet the social demand of modern life is rapidly depleting this nation of commanding figures in our executive departments and legislative halls.

"The efficiency and usefulness of our great hospitals are being impaired because many of our ablest surgeons are unwilling or unable to subordinate their private practice to hospital work. Our greatest lawyers are refusing to accept appointments as justices in our highest appellate courts, because such service involves excessive financial sacrifice. The most impressive fact in reviewing the work of some of our past congresses is the scarcity of leaders whose names will go down into the history of our nation. These are men like Mr. Root, whose services should be requisitioned without delay, and it is lamentable that we should not follow the British policy of having some men resign their offices to permit such overshadowing leaders to at least temporarily assume their duties. And along this line it may be that within a few months we may have to follow the action of England and France and form a coalition cabinet.

"It borders upon a national peril that public service, under existing conditions, does not offer a promising field for the development of great leaders. In our diplomatic service we are substantially demanding every four years the resignation of our ambassadors. The tenure of office of the average Cabinet Minister will not exceed three years. Not one single general on the active list of our regular army has ever had opportunity to drill an army corps, and it has only been within the past few years that the opportunity came for these leaders to review even a brigade of troops.

"As compared with an autocracy, democracy appears to have but a limited vision, of the worth to a nation, of great leaders. Napoleon was ever seeking brilliant marshals, and his soldiers understood that every private carried the baton of a marshal in his knapsack if he possessed the commanding military talent to assume such duty. Is it envy and jealousy, or a narrow perspective of statesmanship that makes us blind to the fact that the greater the crisis the more needful for overshadowing leadership? Even where there comes forth one possessing the commanding traits of the leader, it sometimes appears as if the greater his possibilities of achieving such distinction, the more distinctly he becomes the target for official elimination.

"Our railroads have not only been legislated to a point bordering upon insolvency, but have been subjected in many instances to such financial chicanery that to-day there is almost a dearth of commanding figures as regards railway transportation. It has been conservatively estimated that it will require ten billions of dollars for necessary expenditures in placing the rolling stock and track equipment of our railroads in good order. As one of the greatest of our trade papers states:

"The railway system of the country has broken down. This vital factor in the business life of the country, and in national safety if war should come, has practically collapsed, since embargoes on freight are

being issued in every direction, traffic is congested, manufacturing enterprises are hampered and all business is restricted.

"The great problem before the American people to-day, because it is as vital to safety in time of war as to prosperity in time of peace, is how to find the billions that must be expended for an enormous expansion of railroad interests. We are squarely up against this problem, the magnitude of which legislators, national and state, financiers, business men and even railroad people themselves have not heretofore seemed to adequately grasp. Delay cannot be endured longer without great disaster. How shall we meet the problem is the nation's question.

"America is to-day strikingly efficient along but very few lines, and these lines are primarily in the direction of manufactures and finance. We are, however, making strides to efficiency as regards higher education, because the great universities are seeking leaders and administrators rather than scholars as presidents of such institutions. In the administration therefore of our great financial corporations, in organizing and operating vast industrial plants, and in carrying on the varied and extensive work of our great universities, leaders are being developed. It is simply because there is such a lack of commanding leadership in the Congress of the United States that the people have ceased to look to that body for constructive legislation of a character commensurate with the needs of the nation, since for at least ten years our legislational bodies have but substantially followed the will of the executive officials.

"We should, however, be optimistic as regards the future, for I believe that not even a world combination of military powers could crush us, even though our soil might be invaded. If war should come, we possess within our own land nearly every mineral or vegetable product that we would require to conduct vast military or naval operations. The spirit of optimism, however, will never be acquired by a nation until its people make a complete and reliable inventory of its weaknesses and limitations, as well as of its assets and possibilities. If there has been a strain of pessimistic thought in this talk, then reference has been made to such matters only because we may thereby more fully appreciate the handicaps that confront us in assuming the place that we should occupy in the council of nations, and in pursuing the only policy that is consistent with self-respect and honor.

"The spirit and purpose of a nation is but the reflection of some efficient central agency and national purpose that dominates the thought of its people. We have had evidence during the past two years, that dominant and centralized militarism of an autocracy develops efficiency of a certain character, but it is yet to be proved that brutalized energy is enduring efficiency. The new conditions that confront us demand that national purpose should now conform to the trend of the affairs of the world and that we must recognize the fact that new issues call for new purposes. There was one period in our history when the influence of the public schools and colleges dominated American thought. At another time, the influence of the churches combined with community spirit were contributing factors in the determining national purpose. Then again, great moral issues directed the purposes and actions of this nation.

"The saving inheritance of America at this time must be a determination to uphold its rights upon land and sea and to demand that the protection we afford the citizens of other lands must be accorded our people when residing in those lands. We ought not forget that from the days of the Goths and Vandals, the prosperous lands have been the envy of the marauder, and national protection whether it be founded upon humanity or upon the defence of our frontiers and coasts, can only be maintained by force of arms. There are undoubtedly periods when high ideals should control the policy of a nation, but there are likewise times when the sword should be unsheathed.

"If war awaits us, then it will be the women of our land who will be the greatest sufferers, and from this viewpoint, you Daughters of the American Revolution are vitally concerned in what may transpire even before the setting of to-day's sun. As one writer states:

"This month, this day, may be one of the supremest in the life of the nation, and perhaps in human civilization. It may be a month, a day, big with destiny and momentous beyond the human mind to grasp. It ought to be a month that will definitely decide our relations with the Entente Powers.

"As regards your brothers, fathers, loved ones and husbands, what may be required of them may but be the inspiring courage of the crisis, while from you will be demanded the patient, continued, and depressing courage of conviction and what Dean Hodges terms common-place service. It is a courage that is far higher than that of the crisis, for it is in general, an attribute that brings but little recognition and distinction, but rather sorrow and suffering. It is courage that demands toil and self-sacrifice and of the carrying of a great burden, and yet there comes with such sacrifice something more than the consciousness of duty well done—for there will come peace, and peace with the knowledge that you gave your best and your all to your country. Is it not expected, of such as you, that the military service and traditions of your continental forbears will be exemplified in the patriotism and loyalty of their descendants?

"While awaiting the destiny of events, certain patriotic duties devolve upon the women of America. The children of this land should be taught thrift, for in time of war it will be needful to conserve all our resources for military purposes. It will primarily be your duty to inculcate in the younger generation a deep sense of loyalty to country; but the final and severest sacrifice that you may be called upon to make will be that you will even urge, if necessary, that those who are the most dear to you should go to the battleline."

NAVIGATION AND RADIO

RADIO DISTANCE DETERMINING APPARATUS.—The following is furnished by the Bureau of Steam Engineering, United States Navy Department:

The attention of all ships navigating the approaches to New York Harbor is invited to the recent installation on Fire Island Light Vessel of a combined radio and submerged sound signal transmitter which determines the receiving ship's distance from the light vessel. (Call letters, NLS; station, lat. 40° 28′ 33″ N., lon. 73° 11′ 24″ W.)

The station was put in commission on January 15, 1917.

This apparatus will be in operation during fog, mist, rain, or falling snow. The range of this apparatus is limited to the receiving range of the submarine bell receiving equipment employed on shipboard, and in all practical cases this is within six or seven miles.

The submarine bell strikes six strokes, pause, then eight strokes once every 38 seconds: Thus: Six strokes (10 seconds), pause (four seconds), eight strokes (14 seconds), and then an interval of 10 seconds. Total time required, 38 seconds.

A clock mechanism on the light vessel operates so that about one-half second after the first stroke of the six-bell character is made the light vessel emits 15 radio dots, spaced so that the interval between them is that required for sound to travel one-half mile in sea water (about one-half mile a second). Since radio waves travel with the velocity of light, for moderate distances the time for transmission can be neglected. It requires 8.75 seconds to send the series of 15 radio dots.

A vessel determining her distance from the light vessel should, when within range of the submarine bell (six or seven miles), listen to hear the bell strike six, interval eight; then after a silence of about 10 seconds (depending on the distance from the light vessel) the radio dots

will begin to be heard; and it is necessary to count each of these dots until the first stroke of the six submarine signals is again heard. The number of dots thus determined gives the distance in half sea miles from the light vessel.

Example.—(*a*) Eleven radio dots are received before the first stroke of the bell; the distance is 11/2 of 5½ miles.

(*b*) Four radio dots are received; the first submarine bell signal appearing midway between the fourth and fifth radio signals; the total number of radio signals received is 4½, and the distance is 4½ divided by 2, or 2¼ miles.

The most convenient method of receiving these signals is to have one receiver connected to radio and the other receiver connected to submarine bell detector, thereby connecting one ear to radio signals and the other to submarine signals.

These signals will also be furnished in clear weather when requested to do so by radio. It is requested that all passing vessels equipped with submarine signal receiving apparatus familiarize themselves with this apparatus and report success obtained to the Hydrographic Office.

Wave length used is 400 meters for distance signals and 600 meters for ordinary communication.

Watches are stood as follows:

(1) Continuously during thick weather.

(2) During clear weather, first 15 minutes of every hour from 8 a. m. to 9.15 p. m.

Although this station has proved accurate on test, the apparatus is in an experimental stage and too much reliance should not be placed on it until its worth has been proved under service conditions.

ADMIRAL FISKE TELLS OF TORPEDOPLANE.—Rear Admiral Bradley A. Fiske, U. S. N., spoke at the Pan-American Aeronautical Exposition in New York City, on February 12, and devoted most of his address to describing the importance of the torpedoplane, an invention of his that he patented in 1912. It is used for the aerial launching of Whitehead torpedoes.

"We can only hope to catch up with the other countries of the world," Admiral Fiske said in his address, "by including in our naval program the most effective new inventions, and the torpedoplane, under favorable conditions, would make the $20,000 airplane a worthy match for a $20,000,000 battle cruiser. That the torpedoplane will become an important factor in naval warfare in the near future, many people have no doubt. It is a scheme whereby the regular Whitehead auto torpedo may be launched from an airplane as effectively as it is launched from a destroyer.

"The aviator approaches his target from a great distance and high up in the air, and when say six or seven miles away he volplanes toward the water, runs above the surface of the water a short distance, heading toward his target and when ready simply pulls a lever. The action of pulling the lever releases the torpedo, which is rigidly held under the airplane, and at the same time throws back the starting lever, with the result that the torpedo falls into the water in the same way as if it had been dropped from a destroyer.

"I received private information from Europe about a year ago that a lieutenant in the British Navy made four flights over the land into the Sea of Marmora in an airplane, under which a Whitehead torpedo was secured, and sank four Turkish vessels, using 14-inch torpedoes weighing 731 pounds each. For this service he received the Distinguished Service Order. A short time ago I got a verification of this news from a wholly different source, and I also received further information which is of absolute reliability that one of the belligerent countries is taking means to use this plan on a large scale."—*Army and Navy Journal*, 16/2.

ENGINEERING

DANGER IN FILTERING GASOLINE.—Static charges of electricity of considerable magnitude may be produced when gasoline is filtered through chamois skin and other insulating filtering mediums. Greater charges result when the air is dry and cold than when it is warm and damp. Recent experiments at the Bureau of Standards show that in cold, dry air it is extremely difficult to avoid the production of such charges, if the gasoline is filtered through chamois skin, but that the use of fine wire gauze in place of the latter practically eliminates the danger. In addition to the electric charge produced by filtering, charges may be produced by the friction of clothing against the cushions of automobile seats, by gloves against other objects, etc. The danger due to charges produced in either of these ways may be avoided by touching the funnel against the metal tank at some distance from the opening before inserting the funnel and then inserting it into the opening in the tank in such a way that it remains in metallic contact with the tank throughout the filtering process. These two precautions, says the Bureau of Standards, prevent the accumulation of charges of opposite sign on the funnel and the tank, respectively, and eliminate the possibility of the passage of an electric spark between them.—*Scientific American.*

AERONAUTICS

NOTE.—There are no changes in the table of Zeppelin Losses as published in the March issue of the PROCEEDINGS.

THE ZEPPELINS' FAILURE.—While it may or may not be true that the Zeppelin Works at Friedrichshaven have been closed down, it is becoming more and more evident that these great dirigibles that Germany had placed her confidence in as effective weapons of offense in time of war have failed to realize what was expected of them. The Zeppelins are from all experience too liable to disabling accidents and too unreliable in the matter of dropping bombs effectively. There is no doubt about their ability to fly and to do effective work under favorable conditions, but calms and clear skies cannot always be relied upon and the result has been such terrible disasters as have overtaken the *L-1* and *L-2*. The first was made helpless by a sudden storm which wrecked it in the North Sea and drowned the 15 or 20 men in the crew, and the second exploded in midair, killing 28 men. These disasters occurred before the breaking out of the war, while since hostilities have been in progress the vulnerability of the Zeppelins has become even more apparent. There are two contributing causes for the failure of these great airships, namely, their bulk and the elevation, 5000 feet, at which they are compelled to maneuver. The first makes them unwieldy and a ready target for the modern anti-aircraft gun; the second makes accuracy of attack by them very uncertain.

To the German Government, broadly speaking, this failure may not be of such very great moment, as at best air navigation and the conquest of the air is still largely in its infancy, so that Germany is no worse off in this respect than any other military power.—*Marine Journal.*

CURRENT NAVAL AND PROFESSIONAL PAPERS

UNITED STATES

NORTH AMERICAN REVIEW. **March.**—Evolution of Commercial Blockade, by *Edw. S. Roscoe.* Our Naval Problem, by *Lieut. Commander L. A. Cotten, U. S. Navy.*

REVIEW OF REVIEWS. **March.**—The Navy and National Defence. Our New Caribbean Islands, by *Eldred E. Jacobsen.*

CURRENT HISTORY (*N. Y. Times*). **March.**—The British Navy's Task (*Adm. Jellicoe's Address of January 11*). Comparative Strength of Navies To-day, by *T. C. Frothingham.* Battle of Jutland, by *Lieut. C. C. Gill.*

SCIENTIFIC AMERICAN. **March 3.**—The Machinery of Ships, by *Lieut. Commander H. C. Dinger, U. S. Navy.* Anti-Submarine Patrol, by *Marion Eppley.*

MARINE CORPS GAZETTE. **March.**—Motor Transportation in the Marine Corps, by *Capt. F. E. Evans.* Scouting Flights in Defence of Isolated Naval Bases, by *Maj. H. C. Davis.* Hints to the Foot Soldier in Battle, by *Capt. Andrae Lafargue, French Army.*

JOURNAL OF U. S. ARTILLERY. **March.**—Searchlights, by *Lieuts. Baird and Noyes, U. S. Army.* The Supply of an Army, by *Capt. J. A. Moore, U. S. Army.*

JOURNAL MILITARY SERVICE INSTRUCTION. **March-April.**—What Have We Learned? (*Prize Essay*), by *Major Stockton.*

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UNITED SERVICE MAGAZINE. **February.**—A Submarine Survey, by *Percival A. Hislam.*

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THE SUBMARINE BLOCKADE

Under the title "Can the *U*-Boat Win the War?" the *Literary Digest* of February 17 gives the following summary of discussions of the possibilities of unrestrained submarine warfare and what it must accomplish to succeed in its object.

"The emphatic disapproval aroused throughout the neutral world by Germany's resumption of unrestricted submarine warfare leads many competent observers to inquire whether the Fatherland is not paying too high a price for what may, after all, prove an expensive luxury. Even in Germany itself there are naval critics of high standing who do not hesitate to warn the German nation that submarine warfare may not yield the great results that have been expected. To this number belongs Captain Persius, who, in the *Berliner Tageblatt*, asks whether the submarine war on merchant shipping will be 'a most important factor in bringing about peace,' and he is by no means sure that it will. Writing at the beginning of the year and having in mind just such a development as has transpired, he says:

"'The increasing success of our submarines has in the last few months become surprising. Nevertheless, nothing would be more foolish than to build up hopes on this and think, for example, that our successes must go on increasing at the same rate, so that in spring we might be sinking a million tons a month. The more the submarine war on commerce increases, the more serious become the difficulties it has to face. The number of ships daring to go to sea declines, the ships which still sail are more strongly armed, and the skill of their captains in repelling submarine attacks increases. Lastly, the number of enemy instruments for destroying submarines increases. . . . . It would be a sin against our own people to conceal the truth—that endless waiting and inexhaustible confidence are necessary in our submarines till they will finally be able to reach the desired goal.

"'If one underestimates the difficulty of the task, it is sheer ingratitude to our submarine crews, who are beyond all praise, who fearlessly set out again and again on voyages full of danger beyond description, ready to offer their lives for their country, perhaps in a most painful fashion. . . . . That German submarines are inspired by an untiring activity is shown from the figures of tonnage destroyed: 1915: January, 14,000 tons; February, 27,000; March, 83,000; April, 33,000; May, 93,000; June, 84,000; July, 77,000, etc. In 1916 the figures rose rapidly. In January-February,

238,000 tons were sunk, in March and April, 432,000 tons. In September, 141 enemy ships were sunk of 182,000 tons, and 39 neutrals of 72,600 tons, and in October, 146 enemy ships of 306,500 tons and 72 neutrals of 87,000 tons. In November the tonnage rose to 408,500, and the December total, not yet published, will, it is hoped, be similar.

"'The English Navy finds itself practically impotent against the losses of the mercantile marine. Its submarines cannot return like for like to the enemy. The merchant shipping of the Central Powers has disappeared from the sea since the outbreak of war, so that it cannot be attacked. Where traffic still goes on, as in the Baltic, the English and Russian submarines have been a failure. We have done our best, so far with success, to turn the fact that we are cut off from the world's markets to our advantage. We cherish the expectation that the enemy will not be so able to adapt themselves to the altered situation when the economic war has been intensified still more. There is therefore a contest between us, the object of which is to cripple the other side economically. The future still conceals from us who will hold out longest in the race.'

"Admiral Lacaze, the French Minister of Marine, tells the French Senate that Germany's move is 'horrible, but ineffective.' This judgment he bases upon the performances of German submarines in the past, and states that during the last 11 months they have sunk only one-half of 1 per cent of all the tonnage entering French ports. As reported by the Paris *Journal des Débats*, he began by stating that the aim of the German Government was rather to terrorize than to destroy:

"'The Germans are trying to do now what they always have done. The world ought to know that they have endeavored to terrify us since the beginning of the war. Disregarding the humanitarian engagements they made at The Hague, they have not hesitated to throw crews and passengers into frail boats and abandon them to the waves in tempests far from any coast. In a great many cases, even recently, numbers of their victims who could not be reached in time died of hunger, thirst, and cold. What more horrible than that can the Germans do? There is not a man in the world who has not learned with horror of the deeds of which the Germans have been guilty. The declaration of to-day does not move us. The army, the navy, and civilians all maintain the same calm before the horrible crimes of our enemy.'

"After saying that the French naval authorities had taken every precaution, he continued:

"'Fifty-one million tons of merchandise entered our ports during the last 11 months. One-half of 1 per cent has been sunk by submarines. Possibly in the future this proportion will be a little higher, but the sole result will be that the country will understand more thoroughly that we are at war.'

"The great majority of the German papers think that the new campaign marks the beginning of the end of the war, which, they confidently believe, will be brought to a victorious conclusion before the summer. The Berlin *Lokal Anzeiger* voices the general opinion when it says:

"'What is now demanded of our *U*-Boats surpasses all they have heretofore accomplished. They are expected to shut off England, France, and Italy, from all oversea communication, a task which only a few years ago no sane person would have thought worth discussing. No higher praise could be paid to the excellent reputation which our *U*-boat commanders have created for themselves within two years than the fact that to-day nobody doubts their ability to accomplish this gigantic task.

"'They will do it. As to that, there is only one opinion in all Germany and among her allies. They will impose Germany's victorious will upon a vainglorious enemy.

"'In these last two years they have gained immense experience in the new method of warfare. They have learned to fight wind and sea and British cunning and their boats have developed an efficiency never

dreamed of before. They have to deal with a hostile merchant fleet, which in the hard service of the war has lost much of its former efficiency, being manned by crews that are certainly no longer first class. The best seamen were long ago absorbed by the navy. Their places were taken by colored men, and we know by experience how the sight of our *U*-boats affects the spirit of hostile and neutral crews. Our *U*-boat commanders do not fear the enemy's mysterious means of destruction, of which there has been so much talk of late. The conviction that the whole German people is behind them will lead them and their brave crews to the highest spheres of glory.

"'Our enemies are seen to be already in fear of what is coming. They were asking for it and shall not be disappointed.

"'As to the neutrals—we can no longer be bothered by their opinion. We have only one duty now—to win. To this end we must look neither to right nor left until the German war-aims are reached.'"

Mr. Archibald Hurd in the *Fortnightly Review,* writing before the announcement of the intensified phase of the submarine blockade, says that the shortage of shipping is becoming a matter of importance to Great Britain. At the outbreak of the war, according to Mr. Hurd, a large proportion of the British Merchant Marine was at once diverted, part to the service of the Admiralty and part to supplement the inadequate transportation of the other entente nations. During the war there has been a relatively small but constant wastage of the merchant fleet without balance by captures from the enemy. Shortage of labor and government work in private yards has so interfered with the shipbuilding industry that losses have not been made good; ship construction being about one third as great now as before the war, according to the President of the Society of Naval Architects and Naval Engineers. Mr. Hurd suggests that the remedy is restriction of trade in luxuries and immediate acceleration of shipbuilding. He thinks that, since Great Britain is supplying ocean transportation for all the Allies, an equivalent number of men should be released from army service to reenforce the shipping trades.

Whether or not the conditions discussed by Mr. Hurd will be sensibly aggravated by the unrestricted use of submarines has been the subject of much speculation in the Allied Press. The general opinion expressed is that Germany can do little more than she has accomplished in the past. The achievements of the German submarines during February is discussed as follows in the *Literary Digest:*

"'We stake everything,' said the German Chancellor in offering unrestricted submarine warfare as Germany's answer to her enemies' challenge to fight to the end. In view of such declarations, interpreted by many in this country and England to mean that the new campaign is Germany's last resource, the results of the first month of the campaign are well worth noting as an indication of probable success or failure. If successful, say some observers, the German *U*-boats may next appear off our own coast. One million tons a month was looked for as the 'wreck-crop' of Germany's submarine harvesters, the Chicago *Evening Post* remembers, and it joins with other observers in pointing out that the estimates far exceeded the actual returns for the first month of 'unrestricted' warfare. True, February is a short month, but this is not held to justify the 40 per cent discrepancy our editors find. The first month of the ruthless under-water campaign ended, reckons the New York *Journal of Commerce,* quoting figures slightly in advance of those printed in other dailies on

March 1, with a total of 187 ships, aggregating 479,087 tons, lost as follows: British, 115; American, 2; other neutrals, 48; other belligerents, 20; not identified, 2. The *New York Times* prints this table of losses for the past five months:

	Entente		Neutral	
1916	Ships	Tons	Ships	Tons
October	146	366,500	72	87,000
November	152	230,000	68	82,000
December	125	235,000	37	60,000
1914				
January	170	336,000	58	103,500
February	134	368,274	54	97,496

"'While this attrition is serious,' comments the Chicago daily just quoted, 'it is not serious enough to achieve the original intent of Germany —the paralysis of Great Britain before her West front offensive begins.' Using British Admiralty figures, the New York *Evening Post* calculates that the daily average of *U*-boat 'frightfulness' was 17,000 tons last month as against 12,500 in December. Against such a drain *The Evening Post* does not think that England can cope indefinitely, but if the process of British collapse should be prolonged 'public opinion in Germany will have to be prepared for another disenchantment.' To the Louisville *Post* the fact that Great Britain imported more cereals during the first 10 days of February, 1917, than during the corresponding days of 1916 or 1915, means that the submarine campaign is probably a failure.'"

Many writers think that the German organization will continue to increase in efficiency, and that the February results are not an indication of what may be accomplished later. Arthur Pollen, the naval expert of *Land and Water*, does not share in this belief. He says that, since so much depends on the moral effect of immediate and overwhelming success of the submarine war, it is reasonable to suppose that Germany would apply all her resources at the start, and that sooner or later the necessity for replenishing supplies and overhauling the submarines will require the withdrawal of part of her underwater forces and the establishing of a system of reliefs, whereby part of the flotilla would be always in port.

The *New York Times* gives the following review of the first month of unrestricted war:

"The first month of unrestricted submarine warfare has developed one salient fact—the German campaign has been highly successful, inasmuch as it has disorganized and almost completely stopped neutral trade in European waters. American mail and passenger liners are held safely in our ports; only a few merchantmen are venturing forth to the barred zone. Traffic between the United States, Holland, and Scandinavian ports has stopped except for vessels which are taking the long northern route around the German danger zone.

"This situation may not last long. It depends upon the British Navy's success in subduing the submarine. Nevertheless, the cessation of neutral trade, even for a short period of time, is harmful to the Entente Allies and correspondingly helpful to Germany. It reduces the world's available tonnage. A considerable part of the neutral tonnage, particularly that owned by Norway, has been engaged in carrying for the Allies. It is no longer employed in any direction, and the Allies are therefore dependent upon their own merchant fleets, now the object of persistent attacks by the German *U*-boat flotilla.

"Germany's threat to sink all vessels found within her barred zones has had the effect desired by Berlin, but in another sense the *U*-boat warfare has apparently not been as successful as its sponsors might have wished. An unofficial announcement at the beginning of the campaign said that the Germans hoped to account for 1,000,000 tons of shipping a month—a tonnage that should destroy England's merchant fleet within a few months, and so force her to sue for peace. The allied reports for February show that 466,073 tons of shipping were lost during the month. Fifty-four neutral vessels and 135 allied vessels were sent down. These figures may prove not to be complete, and it is probable that the German record will show a much larger tonnage destroyed.

"Whatever the correct figures, the loss is serious enough, and the question now is whether the rate of destruction will increase or decrease. The present month should give the real measure of the campaign and indicate whether England is actually losing command of the sea. In a sense Britannia no longer rules the waves. She certainly does not rule under the waves. While her naval strength is unimpaired—is, in fact, immeasurably stronger than when the war began—England is able to protect only a part of her merchant marine. The German submarine threatens to take command of the sea, not by destroying England's fleet, but by destroying England's merchant craft and cutting her communications, the vital artery by which her people are fed.

"The duel for sea control becomes more intense day by day and accounts for several significant naval moves made in the course of the last two weeks. For instance, England has modified her North Sea danger zone, but has tightened her blockade of Germany by requiring neutral vessels which may be suspected of carrying enemy goods to call at British ports for examination, or, if necessary, adjudication before a prize court. The British Parliament has been called upon to authorize new enlistments to increase the personnel of the Royal Navy to 450,000 men, and this alone would have been an acknowledgment of the gravity of the submarine menace had not Sir Edward Carson, First Lord of the Admiralty, frankly admitted to Parliament that the allied ship losses were serious and that there was no magic remedy for the *U*-boat evil.

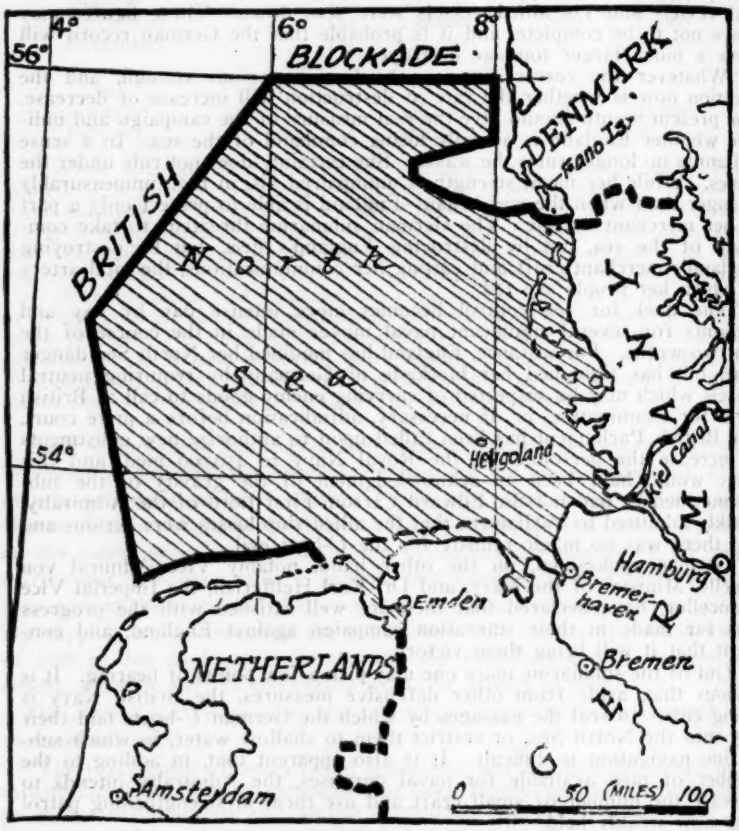
"German spokesmen, on the other hand, notably Vice Admiral von Capelle, Minister of the Navy, and Dr. Karl Helfferich, the Imperial Vice Chancellor, have declared that they are well satisfied with the progress thus far made in their starvation campaign against England, and confident that it will bring them victory.

"Out of the submarine maze one may pick a few points of bearing. It is obvious that, aside from other defensive measures, the British Navy is trying either to seal the passages by which the German *U*-boats find their way into the North Sea, or restrict them to shallow water, in which submarine navigation is difficult. It is also apparent that, in adding to the number of men available for naval purposes, the Admiralty intends to increase the number of small craft and use them in strengthening patrol lines now weakly held.

"The wider radius of the new type of German *U*-boat has compelled a radical change in British tactics and strategy. When the submarines used in the first campaign succeeded in getting around the coasts of Scotland they were obliged to return almost immediately to replenish their supplies. They also had to work inshore, where nets and traps and other destructive devices could be effectively used. Not so with the big, new boats. A voyage around Scotland does not diminish the submarine's capacity to keep the sea for three weeks or more, and, moreover, the boat can work far out on the ocean trade routes, where the danger from nets is reduced to a minimum, and a close patrol is not wholly practicable.

"Therefore, the British problem is to confine the *U*-boat to the North Sea, or at least to prevent large numbers of them from getting into the Atlantic. Hence the new danger zone proclaimed in the British decree

of January 25. This zone, as originally charted, spread in the shape of a fan from Flamborough Head, England, toward the coasts of Holland and Denmark. The narrow portion of the fan has now been eliminated, possibly because it served no useful purpose, and the danger area is therefore about half the size of the original. The nature of the zone is not exactly apparent. Probably it is a huge mine field, with a close patrol of surface vessels on the outskirts. It completely dominates the German coast on the



BRITISH MINED AREA

(From *N. Y. Herald*, February 17)

North Sea, allowing but two passages for vessels, one about a mile wide off the coast of Jutland, beyond the territorial waters of Denmark, the other four miles wide off the coast of Holland and outside its jurisdiction.

"It is well known in England that the German *U*-boats make their way into the Atlantic by going through the northern end of the North Sea. Few, if any, find it possible to use the shorter route through the English Channel, for the narrow Strait of Dover, with its many defences, has proved to be a puzzle even to the most resourceful German officers. Emerging from Cuxhaven, Wilhelmshaven, and other ports, the *U*-boats

skirt the coasts of Denmark and Norway, using territorial waters if they can, and finally find the open sea between Norway and the Orkney Islands, north of Scotland. From here they travel west and south to their hunting grounds in the Atlantic.

"In its effort to block the means of exit from German ports, or to make the channels so narrow as to hamper the submarine commanders, the British Navy is trying to do in the North Sea what the German Navy successfully accomplished in the Baltic. It will be remembered that in the summer of 1915 British submarines got into the Baltic through the tortuous channel between Denmark and Sweden. Their depredations continued for several months, then were brought to a close by winter. Their operations were not renewed the following spring because in the meantime the Germans had succeeded in sealing up the channel available to the British boats.

"This was a much simpler task than that facing the British in the North Sea. It is difficult to mine successfully against the submarine, except where the channels are narrow and the water shallow, and it is doubtful whether the British danger zone will prove to be more than a half measure of defence. If this is so, the alternative is a more rigid patrol of the sea, particularly that stretch of water, 300 miles wide, between the Orkneys and Norway. This wide outlet, unlike the Strait of Dover and the channel leading directly into the Baltic, cannot be mined successfully on account of the depth of water, and demands a great fleet of patrol boats. It is the weak link in the chain of Britain's defence against the submarine, and is difficult to patrol on account of rough water. But it must be adequately patrolled, without weakening the squadrons of guardships at other points, and Sir Edward Carson's call for more sailors therefore suggests greater effort in the northern passage.

"It is possible that England's danger zone near the German coast is not wholly laid out to hamper the movements of submarines. It serves also to make more difficult a sally of the German High Seas fleet. Winston Churchill, formerly First Lord of the Admiralty, said the other day that the German submarine had thrown the British fleet on the defensive. That is largely so, and it may reasonably be supposed that the British Admiralty does not want to bring about an engagement between the two fleets while the energies and brains of British officers are engaged in the submarine problem. The simplest way to hold the German fleet to its ports is to mine their exits, and this has apparently been done. The danger zone, it may be said, covers the waters where the battle of Jutland was fought.

"There is one port, however, that remains a thorn in the side of the British. It is Zeebrugge, Belgium, a large submarine base far from the British danger zone, and the port from which the German destroyer flotillas emerge to make their raids against the east coast of England. Last week's destroyer raid, like previous ones, served the purpose of harassing the enemy. It was disconcerting, but apparently was intended to achieve no military object of importance. At the same time it was another demonstration of that aggressiveness for which the German Navy has become famous.

"Several naval authorities in England believe that the submarine menace is the direct outcome of the sea doctrine which holds that 'containment is equivalent to victory.' Mr. Churchill, who now hopes that some way may be found to bring about a naval offensive against Germany, is credited with having been a strong advocate, if not the originator, of that doctrine, or heresy, as some naval writers call it. Those who believe in a more vigorous policy hold that the British Navy should have tried in the beginning of the war to seek and destroy its enemy. They believe that that would have been the best way to have protected England's commerce, and contend that a decisive action might have been forced before the German fleet laid its great protective mine fields in Heligoland Bight, where

Admiral Beatty fought his first successful battle. Now it is too late. It is for the German fleet to decide the time of action. Meanwhile its submarine flotilla can go ahead with the work of destruction which the German Government hopes will bring England to her knees and end the war.

"Of the official statements made in Germany recently relative to the success of the *U*-boats, that of Dr. Helfferich is the more interesting because he gives tonnage figures. The Imperial Vice Chancellor said that 'already the navigation which links the British Isles with the rest of the world has been depressed to the danger point. The tonnage arriving in British ports in December last was only 2,000,000, while the monthly average of the last peace year was 4,200,000 tons.'

"This is a formidable decrease, but the figures are misleading. Dr. Helfferich omitted to say that one-half of the British mercantile marine had been requisitioned for the army and navy, and that the movements of these vessels do not appear in the daily lists of arrivals and departures. He also failed to say that almost since the beginning of the war, England has been using but half of her merchant tonnage to carry food for her people and to care for her export trade.

"Accordingly, there is certain to be a wide discrepancy in the amount of reported tonnage arriving in British ports when two months—one of peace, the other of war—are compared. If we could add the tonnage of commandeered ships to those engaged by private interests and make a comparison we should get nearer the truth of the statement that the submarine has shaken the foundations of the British Empire. If the British Empire is not tottering, it is at least facing a grave crisis, as Premier Lloyd George pointed out to Parliament 10 days ago."

On March 14 the Associated Press issued the following dispatch, which is quoted from the *New York Herald:*

"The Associated Press has been placed in possession of a review of the first six weeks of the German unrestricted submarine campaign. The figures given are from the Board of Trade reports, and the conclusions are those of a highly competent authority.

"'The German submarine campaign, reported to have assumed enhanced vigor on February 1, must be singularly disappointing to the Germans themselves,' says the review. 'At the beginning of January, 1917, Great Britain possessed approximately 3731 vessels of 1600 tons or over. Many others of lesser tonnage are not taken into consideration, owing to the importance of restricting the question to over seas traffic and cargo, judging the results carefully and looking to possible future developments.

"'From February 1 until March 14 the losses of British ships of over 1600 tons were approximately 78, which number, deducted from the total, leaves the British mercantile marine with 3653 ships of over 1600 tons after six weeks' German submarine warfare.

"'It should be remembered that a very large proportion of tonnage is on the docks building for the British mercantile marine, and a fair percentage of the total is being turned out monthly. In the total above mentioned no account is taken of ships completed or bought in neutral countries.

"'During the period from February 1 to March 10 no British ships have been in any way blockaded in harbor. Every opportunity of carrying out their plans has been at the disposition of the Germans after their declaration of unrestricted submarine warfare. It is extremely improbable that the German authorities ever will have the same opportunity, for the following reasons:

"'First. A large number of old tramp steamers, slow of speed, have been sunk, as they afforded easy prey.

"'Second. Their efforts would be directed for the first six weeks or two months toward producing the most considerable results by careful organization and administration, with a view to affecting the morale of neutral nations. A careful study of the German methods has been made by the British naval authorities, and anti-submarine measures have been adopted, which, as the outcome of experience, have attained a large measure of success.

"'Third. The arming of merchant vessels is rapidly taking place, and it is capable of proof that a submarine takes particular care in attacking armed vessels, a large percentage of which always escape.

"'Fourth. Anti-submarine devices are being daily perfected, but a little time must necessarily elapse in order that they should receive a proper trial.

"'Fifth. The German naval authorities are bound to find some difficulty in replacing the trained personnel of which they have lost a considerable portion. It should be remembered that there is considerable difference between the efficiency of individual commanders, and the greatest losses have been incurred through the action of a few German submarine commanders, who by their skill and training stand far above the average *U*-boat officers, who leave Germany on missions of destruction.

"'The losses of the British mercantile marine are being steadily reduced. During the past two weeks only 29 have been sunk, as opposed to 48 sunk in the first two weeks.

"'The vessels engaged in the coastal trade are continually exposed to German submarines and are naturally included in a German commander's reports.

"'The most serious aspect of the German submarine warfare is that reflected by consideration of post-bellum conditions with regard to shortage of world tonnage. Besides affecting the whole world it is likely to affect most seriously the smaller nations who have no mercantile marine of their own to rely upon and are dependent upon that of other nations for their sea traffic. However much the Germans may desire to force neutrals to lay up their vessels and close neutral harbors, such a state of things cannot exist long, because the neutrals themselves must obtain certain necessaries in order to avoid the intense economic situation which at present obtains in Germany. This fact is necessarily better known to the neutrals themselves than to those not immediately concerned.

"'As regards the general situation of the submarine warfare, it may thus be summed up: It is having a more serious effect upon European neutrals than upon belligerent mercantile marine. The continual losses of ships will seriously affect post-bellum trade. The losses of British mercantile vessels in the first six weeks represent a percentage of 2.3, while the average daily movement of vessels in United Kingdom ports is 710. This figure excepts fishing and local craft.

"'If the same rate of destruction were to continue at this average it would take at least a year to reduce the British mercantile marine by one-half, without taking into consideration additional tonnage procured from building or purchase.

"'Food restrictions in Great Britain are very necessary and have been imposed in order to avoid the effects of the war pressing too hardly upon the poorer classes of the country, and they further curtail lavish expenditures and the waste of provisions.

"'It is the custom of the German authorities to issue official criticisms of measures adopted by the Allies as regards the control of foodstuffs and restrictions on imports, and these criticisms are produced entirely for the consumption of neutrals and are an attempt to impress their own population with the efficiency of what they term their "submarine blockade."

"'It is only to be expected that we are bound to take precautions in order to avoid within the next two years economic stress which might

then exist here, as it actually does in Germany to-day. The passage of troops and munitions continues without any diminution, and only the neutral countries of Holland, Denmark and Sweden are experiencing a temporary reduction in the amount of exports from England. Apart from butter, the import of foodstuffs in February has been very satisfactory, and it should not be forgotten that in the statistics showing the quantity of foodstuffs imported in the month of February to British ports a considerable quantity which would normally reach them has been diverted to French ports for the use of the British Army.

"'Despite this, however, the position regarding home imports themselves is satisfactory. Flour and grain for February are above the average. Meat shows from 10 to 15 per cent increase above the average of the last seven years. Margarine is coming in greater quantities than in any previous year, and this provides for the falling off in butter. Rubber is increasing slowly each month, and the February average was above that of January. Iron ore shows one-third increase over 1915 and 1916.

"'If any conclusion can be drawn from the Board of Trade statistics of the import of necessities into Great Britain during the month of February, a very different result would have to be shown by the German submarine blockade, for up to the present time there has been no falling off except in sugar, wood and butter.'"

NAVAL OPERATIONS

(From February 17 to March 17)

ITALY MINES HER COAST.—The Italian Government put into effect March 1 the adoption of "urgent and special" measures designed to guard the commerce of Italy against indiscriminate German submarine warfare against all merchant craft traversing the waters around the Italian shores. These measures embrace the establishment of extensive barriers of mines by means of which it is expected that merchant vessels bound for Italian ports will be protected against submarine attack.

The action of the Italian Government was communicated to the State Department in a dispatch, under date of February 27, received by Secretary Lansing to-day from American Ambassador Page at Rome. A paraphrase of Ambassador Page's message was issued at the State Department as follows:

"In a communication dated February 27 the Foreign Office requests that the Secretary of State be immediately notified of the decision of the Minister of Marine on account of the blockade of Italy by the Central Empires to take urgent and special measures to protect commerce of Italy by extensive barriers of mines along the Tyrrhenian seacoast from the first of March.

"Some barriers will be variable, others permanent, and others temporary anchored mines. Neutral boats arriving and departing Italian ports will, through special service organized therefor, be informed routes to follow, as a protection against all danger. Details of geographic position of danger regions cannot be given owing to military exigencies."—*N. Y. Times.*

VESSELS LOST.—Naval vessels have been reported lost during the period February 17 to March 17 as follows:

Italian Transport.—The Italian transport *Minas*, 2854 tons, was sunk by a German submarine in the Mediterranean on February 16.

British Destroyer.—A British destroyer sank with all hands in the North Sea on March 1. It is believed she struck a mine.

British Transport.—Berlin announces the sinking of a 35,000-ton transport in the Mediterranean on February 24. The name of the vsssel is not given and the report has not been confirmed by Great Britain.

French Destroyer.—The French destroyer *Cassini* was sunk by a submarine while on patrol duty in the Mediterranean on February 28.

TABLE OF NAVAL LOSSES OF THE VARIOUS BELLIGERENTS SINCE THE OUTBREAK OF WAR

The following table is compiled from various articles appearing in the press of the several belligerent nations. These reports are so contradictory that it is impossible to furnish an absolutely correct list of vessels lost to date. In many cases the belligerent powers have failed to acknowledge the losses of all the vessels. No attempt has been made to include herein a list of the various trawlers, mine-sweepers and such odd small craft which may have been destroyed while mine-sweeping or on submarine patrol duty.

(On the left margin of this table of losses is a reference to the whole number in which an account of the loss is given. A page index of these losses is given in the whole number referred to.

ABBREVIATIONS FOR TYPE OF VESSEL

Dreadnought battleship	d. b.	Torpedo-boat	t. b.
Battleship	b.	Submarine	sm.
Battle cruiser	b. c.	Auxiliary cruiser	ax. c.
Armored cruiser	a. c.	Transport	tr.
Protected cruiser	p. c.	Minelayer	m. l.
Cruiser	c.	Coast guard	c. g.
Light cruiser	l. c.	Hospital ship	h. s.
Gunboat	g. b.	Training ship	tr. s.
Torpedo gunboat	t. g.	Patrol boat	p. b.
Monitor	m.	Armed merchant vessel	a. m. v.
River monitor	r. m.	Yacht	y.
Flotilla leader	f. l.	Naval tender	n. t.
Destroyer	d.		

LOSSES OF GREAT BRITAIN AND HER ALLIES

BRITISH WARSHIP LOSSES

WHOLE NUMBER	NAME	TYPE	TONNAGE	REMARKS	DATE
154, 155, 156	Audacious	d. b.	23,000	Reported sunk off Irish coast. Cause unknown. British Admiralty, non-committal	27-10-14
155	Bulwark	b.	15,000	Internal explosion at anchor in the Thames	26-11-14
156	Formidable	b.	15,000	Sunk by German sm., North Sea	1- 1-15
156	Irresistible	b.	15,000	Sunk in the Dardanelles	18- 3-15
156	Ocean	b.	12,950	Sunk in the Dardanelles	18- 3-15
161, 162	King Edward VII	b.	16,350	By mine, North Sea	9- 1-16
158	Goliath	b.	12,950	Torpedoed in Dardanelles	12- 5-15
158, 161	Triumph	b.	11,800	Sunk by sm., Dardanelles	25- 5-15
158	Majestic	b.	14,900	Sunk by sm., Dardanelles	27- 5-15
163, 164	Russel	b.	14,000	Sunk by mine, Mediterranean	26- 4-16
168	Cornwallis	b.	14,000	Sunk by German sm. in Mediterranean	9- 1-17
164	Queen Mary	b. c.	27,000	Sunk by gunfire, battle of Jutland	31- 5-16
164	Indefatigable	b. c.	18,750	Sunk by gunfire, battle of Jutland	31- 5-16
164	Invincible	b. c.	17,250	Sunk by gunfire, battle of Jutland	31- 5-16
161, 162	Natal	a. c.	13,550	Internal explosion and sunk at anchor	30-12-15
154	Hogue	a. c.	12,000	Sunk by German sm. U-29, North Sea	22- 9-14
154	Cressey	a. c.	12,000	Sunk by German sm. U-29, North Sea	22- 9-14
154	Aboukir	a. c.	12,000	Sunk by German sm. U-29, North Sea	22- 9-14
154, 155	Good Hope	a. c.	14,100	Sunk by German forces in Pacific	1-11-14
154, 155	Monmouth	a. c.	9,800	Sunk by German forces in Pacific	1-11-14
160	Argyll	a. c.	10,850	Ran aground, east coast of Scotland	28-10-15
164	Defense	a. c.	14,600	Sunk by gunfire, battle of Jutland	31- 5-16
164	Black Prince	a. c.	13,550	Sunk by gunfire, battle of Jutland	31- 5-16
153, 164	Warrior	a. c.	13,550	Sunk by gunfire, battle of Jutland	31- 5-16
164	Hampshire	a. c.	10,850	Sunk by mine, off Orkneys	6- 6-16
154	Hawke	l. c.	7,350	Sunk by German sm. U-9, North Sea	16-10-14
153, 155	Pathfinder	l. c.	2,940	Sunk by German sm., North Sea	5- 9-14
165	Falmouth	l. c.	5,250	Sunk by German sm., North Sea	19- 8-16
165	Nottingham	l. c.	5,440	Sunk by German sm., North Sea	19- 8-16
153	Amphion	l. c.	3,360	Sunk by mine, North Sea	6- 8-14
153	Pegasus	l. c.	2,135	Sunk by German c. Koenigsberg at Zanzibar	20- 9-14
162	Arethusa	l. c.	3,750	By mine off east coast of England	14- 2-16
155	Hermes	l. c.	5,600	Sunk by German sm. U-27, North Sea	31-10-14
163	Penelope	l. c.	3,600	Reported damaged beyond repair, attack on Lowestoft	25- 4-16
167	Newcastle	l. c.	4,800	Sunk by mine, Channel	15-11-16
153	Speedy	t. g.	810	Sunk by mine, North Sea	3- 9-14
154, 155	Niger	t. g.	810	Sunk by German sm. while at anchor	11-11-14
164	M-30	m.	——	Sunk by Turkish gunfire, Gulf of Smyrna	13- 5-16
164	Tipperary	f. l.	1,850	Sunk by gunfire, battle of Jutland	31- 5-16

BRITISH WARSHIP LOSSES—Continued

WHOLE NUMBER	NAME	TYPE	TONNAGE	REMARKS	DATE
104	Turbulent	f. l.	1,850	Sunk by gunfire, battle of Jutland	31- 5-16
	Bullfinch	d.	370	Sunk in collision with Dutch merchant ship	18- 8-14
	——	d.	——	Ran ashore, Scotch coast	27-12-14
	Erne	d.	550	Wrecked in a storm	- 2-15
157, 158	Recruit	d.	385	Sunk by German sm., North Sea	1- 5-15
157, 158	Maori	d.	1,035	Blown up by mine off Belgian coast	7- 5-15
159	Lynx	d.	935	Sunk by mine	10- 8-15
161	Louis	d.	965	Wrecked, Eastern Mediterranean	10-11-15
162	Coquette	d.	365	Sunk by mine, North Sea	?- 3-16
164	Fortune	d.	920	Sunk by gunfire, battle of Jutland	31- 5-16
164	Sparrowhawk	d.	950	Sunk by gunfire, battle of Jutland	31- 5-16
164	Ardent	d.	950	Sunk by gunfire, battle of Jutland	31- 5-16
164	Shark	d.	950	Sunk by gunfire, battle of Jutland	31- 5-16
164	Eden	d.	555	Sunk after collision, English Channel	16- 6-16
164	Nomad	d.	1,200	Sunk by gunfire, battle of Jutland	31- 5-16
164	Nestor	d.	1,200	Sunk by gunfire, battle of Jutland	31- 5-16
165	Lassoo	d.	1,500	Sunk, mine or torpedo, North Sea	13- 8-16
166	Flirt	d.	360	Sunk by gunfire of German d.	26-10-16
166	Nubian	d.	985	Torpedoed by German d. and ran aground	26-10-16
168	——	d.	——	Collision	21-12-16
168	——	d.	——	Collision	21-12-16
169	——	d.	——	Destroyed by mine	8- 2-17
169	——	d.	——	Damaged by torpedo from German d. and sunk by own crew	1-23-17
170	——	d.	——	Destroyed by mine	1- 3-17
158	No. 10	t. b.	244	Sunk by German sm., North Sea	10- 6-15
158	No. 12	t. b.	253	Sunk by German sm., North Sea	10- 6-15
160	No. 96	t. b.	130	Sank after collision with merchantman, Straits of Gibraltar	1-11-15
162	No. 11	t. b.	253	Sunk by mine, North Sea	2- 3-16
153	AE-1	sm.	725-810	Accidentally sunk off Australian coast	14- 9-14
154	E-3	sm.	725-810	Rammed and sunk by German vessel	18-10-14
154, 155	D-5	sm.	550-600	Sunk by German mine, North Sea	3-11-14
	D-2	sm.	550-600	Reported lost. Details not known	1-12-14
	E-10	sm.	725-810	Missing, North Sea	———
157	E-15	sm.	725-810	Ran aground in the Dardanelles and destroyed by own picket boats	18- 4-15
162	——	sm.	——	Stranded, Dutch coast	20- 1-16
162	E-17	sm.	725-810	Reported as sunk off Holland	6- 1-16
159, 160	AE-2	sm.	725-810	Sunk, Sea of Marmora	30- 4-15
	E-13	sm.	725-810	Sunk by German torpedo craft off Danish coast	19- 8-15
160	E-7	sm.	725-810	Sunk at Dardanelles	4- 9-15
160, 161	E-20	sm.	——	Announced as sunk by Turks in Dardanelles	5-11-15
163	E-22	sm.	——	Sunk off Holland	25- 5-16
154	Oceanic	ax. c.	17,274	Ran aground off north coast of Scotland in storm	8- 9-14
162, 163	Alcantara	ax. c.	15,300	Sunk in battle, North Sea	29- 2-16
	Rohilla	ax. c.	7,400	Ran aground off Whitby, completely wrecked	30-10-14
156	Viknor	ax. c.	5,386	Lost off Irish coast	14- 1-15
	Clan Macnaughton	ax. c.	4,985	Lost in a gale	3- 2-15
157	Bayano	ax. c.	5,948	Probably torpedoed by German sm. in Irish Sea	12- 3-15
159	Ramsey	ax. c.	——	Sunk by German ax. c. Meteor, North Sea	8- 8-15
159	India	ax. c.	7,900	Sunk by German sm., North Sea	10- 8-15
169	Laurentic	ax. c.	14,900	Destroyed by mine	31- 1-17
165	Duke of Albany	a. m. v.	1,977	Sunk by German sm., North Sea	24- 8-16
159	Royal Edward	tr.	11,117	Sunk by sm., Ægean Sea	14- 8-15
160	Marquette	tr.	7,057	Sunk by German sm., Ægean Sea	26-10-15
160	Ramazan	tr.	3,477	Sunk by German sm., Ægean Sea	17- 9-15
161	Woodfield	tr.	3,584	Sunk off coast of Morocco	30-11-15
166	Franconia	tr.	18,000	Torpedoed by German sm.	4-10-16
168	Russian	tr.	——	Sunk by German sm. in Mediterranean	11-12-16
168	Ivernia	tr.	14,000	Sunk by German sm. in Mediterranean	1- 1-17
168	Ben-my-Chree	n. t.	——	Sunk by gunfire, Kastelorizo Harbor, Asia Minor	11- 1-17
	Hythe	aux.	201	Collision, Ægean	29-10-15
158	Princess Irene	m. l.	——	Internal explosion off Sheerness	27- 5-15
163	Medusa	m. l.	2,800	Collision	- 3-16
161	Abbas	c. g.	298	Sunk by German sm. off Sollum Harbor, Egypt	6-11-15

BRITISH WARSHIP LOSSES—Continued.

WHOLE NUMBER	NAME	TYPE	TONNAGE	REMARKS	DATE
161	Abdel Monaym	c. g.	598	Sunk by German sm. off Sollum Harbor.	6-11-15
161	Anglia	h. s.	1,862	Sunk by mine, English Channel	17-11-15
167	Brittanic	h. s.	——	Mine or sm. in Ægean Sea	22-11-16
	Fishguard II	tr. s.	——	Foundered in gale, North Sea	17- 9-14
160, 161	Tara	p. b.	6,322	Sunk by German sm., Mediterranean	5-11-15
161	Aries	y.	——		15
161	Irene	y.	——		15

FRENCH WARSHIP LOSSES

156	Bouvet	b.	12,007	Sunk at the Dardanelles	18- 3-15
167, 168	Suffren	b.	12,750	Sunk by German sm. off Lisbon	26-11-16
157	Leon Gambetta	a. c.	12,352	Torpedoed by Austrian sm., Straits of Otranto	26- 4-15
168	Gaulois	a. c.	11,260	Sunk by German sm. in Mediterranean	27-12-16
162	Amiral Charnier	c.	4,702	Torpedoed, Mediterranean	8- 2-16
156	Mousquet	d.	298	Sunk by Emden at Penang	28-10-14
156	Dague	d.	720	Sunk by Austrian mine off Antivari	24- 2-15
	Branlebas	d.	330	Sunk by mine	— — —
162	Renaudin	d.	756	Torpedoed, Adriatic	18- 3-16
164	Fourche	d.	845	Sunk by Austrian sm., St. of Otranto	26?-6-16
164	Fantassin	d.	453	Sunk incident to collision	- 6-16
170	Cassini	d.	——	Sunk by German sm. in Mediterranean	28- 2-17
	Zelée	g. b.	636	Sunk by German cruisers at Tahiti	28-10-14
167	Surprise	g. b.	636	Sunk by sm. gunfire at Funchal	-12-16
	No. 347	t. b.	97	Sunk in collision with each other	9-10-14
	No. 338	t. b.	97		
——	——	t. b.	——	Reported lost	- 1-15
	No. 331	t. b.	97	Sunk in collision off Cherbourg	16- 6-15
	No. 219	t. b.	87	Sunk off Nieuport	- 1-15
155	Curie	sm.	398-550	Sunk by Austrians at Pola	23-12-14
156	Saphir	sm.	386-450	Sunk at the Dardanelles	17- 1-15
	Joule	sm.	398-550	Mined, Dardanelles	1- 5-15
	Calypso	sm.	345-490	Rammed and sunk during maneuvers off Cape Lardier	8- 7-15
161	Monge	sm.	392-550	Sunk by Austrians, Adriatic	28-12-15
159	Mariotte	sm.	522-615	Sunk at the Dardanelles	26- 7-15
160	Turquoise	sm.	386-450	Injured by gunfire, Sea of Marmora. Refloated by Turks and renamed Ahmed	3-11-15
161	Fresnel	sm.	398-550	Sunk in the Adriatic by an Austrian ship	5-12-15
166	Faucault	sm.	390	Destroyed by Austrian seaplanes	- 9-16
162	Provence	ax. c.	18,400	Torpedoed, Mediterranean	26- 2-16
	Indien	ax. c.	800	Sunk by sm. off Rhodes	8- 9-15
	Calvados	tr.	6,008	Sm., Mediterranean	3- 6-15
167	Karnak	tr.	6,800	German sm., Mediterranean	27-11-16
166	Gallia	tr.	15,000	Sunk by sm	4-10-16
168	Magellan	tr.	6,000	Sunk by German sm. in Mediterranean	11-12-16
169	Amiral Magon	tr.	——	Sunk by German sm. in Mediterranean	25- 1-17
158, 159	Casa Bianca	m. l.	945	Sunk in the Ægean Sea by a mine	4- 6-15

RUSSIAN WARSHIP LOSSES

166, 167	Imperatrista Maria	d. b.	22,500	Sunk by mine or internal explosion	20-10-16
165	Peresviet	b.	12,764	Wrecked near Vladivostock	- 7-16
	Pallada	a. c.	7,775	Sunk by German sm., Baltic	11-10-14
155, 156	Jemtchug	c.	3,130	Sunk by Emden, Penang	28-10-14
	Kubanez	g. b.	1,280	Reported by Turks sunk by Turkish d.	28-10-14
159	Sivutch	g. b.	875	Sunk by Germans, Baltic Sea	20- 8-15
162	Leit Pushtscheen	t. b.	350	Sunk by German sm. near Varna	10- 3-16
	Putschino	t. b.	——	By gunfire	30-10-14
155	Prut	ax. c.	5,440	Scuttled to avoid capture	29-10-14
	Riasan	tr.	3,522	Captured by Emden	6- 8-14
158	Yenisei	m. l.	2,926	Sunk by German sm., Baltic	6- 6-15
	Oleg	m. l.	1,125	Sunk, Black Sea	24-12-14
	Athos	m. l.	1,743	Sunk, Black Sea	24-12-14
163	Portugal	h. s.	——	Torpedoed by German sm	30- 3-16

JAPANESE WARSHIP LOSSES

168	Tsukuba	a. c.	13,750	Internal explosion	13- 1-17
	Shirotaye	d.	380	Ran ashore, Tsing Tao	4- 9-14
	No. 33	t. b.	82	Sunk by mines while mine-sweeping off Tsing Tao	11-11-14
	Name unknown	t. b.	——	By mine	
167	No. 4	sm.	125	Internal explosion	-11-16
154	Takachiho	p. c.	3,700	Torpedoed by German d., S-90, off Tsing Tao	17-10-14

In addition to the above, five special service ships were sunk during the operations off Tsing Tao.

ITALIAN WARSHIP LOSSES

WHOLE NUMBER	NAME	TYPE	TONNAGE	REMARKS	DATE
165	Leonardo da Vinci	d. b.	22,340	Caught fire and blew up, Taranto harbor	8-16
160	Benedetto Brin	b.	13,215	Sunk by internal explosion	28- 9-15
169	Regina Margherita	b.	13,214	Sunk by mine	11-12-16
158	Amalfi	a. c.	9,958	Sunk by Austrian sm., Adriatic	7- 7-15
158	Garibaldi	a. c.	7,234	Torpedoed off Ragusa, Austrian sm.	18- 7-15
158	Turbine	d.	325	Scuttled to avoid capture after engagement with Austrian vessels, Adriatic	24- 5-15
164	Citta di Messina	ax. c.	3,495	Sunk by Austrian sm., St. of Otranto	26?-6-16
161	Intrepido	d.	680	Sunk by mine, Adriatic	17-12-15
165	Impetuoso	d.	650	Sunk, Austrian sm., Otranto Straits	10- 7-16
168	——	d.	——	Sunk off Corfu	-12-16
	5-PN	t. b.	118	Torpedoed by Austrian sm. off Venice	26- 6-15
	17-OS	t. b.	118	Sunk by own mine while mine-laying off Salvore	- 7-15
158	Medusa	sm.	241-295	Torpedoed and sunk, Austrian sm.	17- 6-15
	Nereide	sm.	221-315	Sunk by Austrian sm., Adriatic	5- 8-15
165	Giacinto Pullino	sm.	400	Captured by Austria	- 8-16
165	——	sm.	——	Reported missing	- 8-16
161	Re Umberto	tr.	——	Sunk by mine, Adriatic	17-12-15
170	Minas	tr.	2,854	Sunk by German sm. in Mediterranean	16- 2-17

LOSSES OF GERMANY AND HER ALLIES

GERMAN WARSHIP LOSSES

164	Pommern	b.	13,040	Sunk by gunfire, battle of Jutland	31- 5-16
164	Lutzow	b. c.	28,000	Sunk by gunfire, battle of Jutland	1- 6-16
155	Yorck	a. c.	9,350	Sunk by German mine near Wilhelmshaven	3-11-14
155, 156, 158	Scharnhorst	a. c.	11,420	Sunk by English forces off Falklands	8-12-14
155, 156, 158	Gneisenau	a. c.	11,420	Sunk by English forces off Falklands	8-12-14
155	Friederich Karl	a. c.	8,858	No official report. Press reports that she was lost in the Baltic	12-14
156, 163	Bluecher	a. c.	15,550	Sunk by British forces off Doggerbank	24- 1-15
160	Prinz Adalbert	a. c.	8,858	Sunk by British sm. in Baltic	23-10-15
153, 154	Mainz	p. c.	4,280	Sunk by British forces, North Sea	28- 8-14
153, 154	Koeln	p. c.	4,280	Sunk by British forces, North Sea	28- 8-14
153, 154	Ariadne	p. c.	2,618	Sunk by British forces, North Sea	28- 8-14
154, 155	Hela	p. c.	2,003	Sunk by British sm. E-9, North Sea	13- 9-14
153	Augsburg	p. c.	4,280	By gunfire	7- 8-14
154, 155, 156, 163, 164	Emden	p. c.	3,592	Sunk by Australian c. Sydney, Indian Ocean	9-11-14
154, 155, 156, 160	Leipzig	p. c.	3,200	Sunk by English forces off Falklands	8-12-14
155, 156, 158	Nurnberg	p. c.	3,396	Sunk by English forces off Falklands	8-12-14
158	Dresden	p. c.	3,592	Sunk by British cruisers in Pacific	14- 3-15
155, 156, 158, 162	Koenigsberg	p. c.	3,340	Sunk by English forces in Rufiji River	11- 7-15
161	Bremen	p. c.	3,300	Sunk by sm. in the Baltic	17-12-15
159	—— (two)	l. c.	——	Gulf of Riga	17- 8-15
153	Magdeburg	l. c.	4,478	Ran ashore in fog in Baltic; blown up by own crew after engagement with Russians	27- 8-14
155	Geier	l. c.	1,630	Interned in Honolulu	8-11-14
160, 161	Undine	l. c.	2,672	Sunk by British sm. in the Baltic	7-11-15
162	Karlsruhe	l. c.	4,822	Press reports state she was blown up by internal explosion while cruising in the Atlantic	4-11-14
164	Elbing	l. c.	5,000	Sunk by gunfire, battle of Jutland	1- 6-16
164	Weisbaden	l. c.	5,000	Sunk by gunfire, battle of Jutland	1- 6-16
164	Rostock	l. c.	4,820	Sunk by gunfire, battle of Jutland	1- 6-16
164	Frauenlob	l. c.	2,650	Sunk by gunfire, battle of Jutland	1- 6-16
	Moewe	g. b.	640	Sunk by her own crew at Dar-es-Salam when English vessels appeared	14- 8-14
	Wissman	g. b.	about 300	Captured by English on Lake Nyasa	20- 8-14
	Planet	g. b.	640	Sunk by her own crew at Yap Island on approach of Japanese fleet	7-10-14
155	Cormoran	g. b.	1,604	Sunk by Germans in Kiao-Chau Bay before surrendering Tsing-Tao to Allies	6-11-14
155	Iltis	g. b.	886	Sunk by Germans in Kiao-Chau Bay before surrendering Tsing-Tao to Allies	6-11-14
155	Tiger	g. b.	886	Sunk by Germans in Kiao-Chau Bay before surrendering Tsing-Tao to Allies	6-11-14
155	Luchs	g. b.	886	Sunk by Germans in Kiao-Chau Bay before surrendering Tsing-Tao to Allies	6-11-14

GERMAN WARSHIP LOSSES—Continued

WHOLE NUMBER	NAME	TYPE	TONNAGE	REMARKS	DATE
155	Jaguar	g. b.	886	Sunk by Germans in Kiao-Chau Bay before surrendering Tsing-Tao to Allies.	6-11-14
	Tsing-tau	g. b.	168	Interned, China	17- 8-14
	Vaterland	g. b.	168	Interned, China	17- 8-14
154	V-187	d.	689	Sunk by British forces, North Sea	28- 8-14
154	S-115	d.	413	Sunk by English destroyers, North Sea.	17-10-14
154	S-117	d.	413	Sunk by English destroyers, North Sea.	17-10-14
154	S-118	d.	413	Sunk by English destroyers, North Sea.	17-10-14
154	S-119	d.	413	Sunk by English destroyers, North Sea.	17-10-14
154, 162	S-90	d.	396	Driven ashore and wrecked by own crew off Tsing-Tao after having torpedoed the Japanese ship Takachiho	20-10-14
155	Taku	d.	276	Sunk by Germans in Kiao-Chau Bay before surrendering Tsing-Tao to Allies.	6-11-14
155	S-124	d.	463	Accidentally rammed and sunk by a merchant vessel in Baltic	22-11-14
	V-186	d.	750	By gunfire	— — —
	S-106	d.	400	By gunfire	— — —
154	S-126	d.	487	By sm.	6-10-14
159	G-196	d.	689	Sunk by British sm., North Sea	26- 7-15
159	——	d.	——	Announced by France as sunk by two French torpedo-boats off Belgian coast.	22- 8-15
	——	d.	——	Reported sunk by Russians in Baltic	19- 8-15
	——	d.	——	Reported sunk by British sm. E-19 between Denmark and Sweden. Not confirmed	14-10-15
	S-116	d.	447	Sunk by English sm. E-9, North Sea	6-10-14
164	—— (five)	d.	——	Sunk by gunfire, battle of Jutland	1- 6-16
169	——	d.	——	Reported sunk in engagement with British destroyers	1-23-17
	A-2	t. b.	about 150	Sunk by British destroyers, North Sea	15- 1-15
	A-6	t. b.	about 150	Sunk by British destroyers, North Sea	15- 1-15
	——	t. b.	——	Officially announced by Russia, blown up by mine	30- 6-15
	——	t. b.	——	Announced by German Admiralty, sunk by mines, Baltic	19- 8-15
	——	t. b.	——	Announced by German Admiralty, sunk by mines, Baltic	19- 8-15
	——	t. b.	——	Sunk by sm., Baltic	17-12-15
159	—— (eight)	t. b.	——	Gulf of Riga	17- 8-15
	——	t. b.	——	Collision, Baltic	15-10-15
153	U-15	sm.	about 450	Sunk by British c. Birmingham	9- 8-14
155	U-18	sm.	about 450	Destroyed by English d. Garry off Scotch coast	23-11-14
160, 161	U-8	sm.	246-295	Sunk by British destroyers	4- 3-15
	U-51	sm.	——	Sunk, Black Sea	17- 7-15
	U-12	sm.	246-295	Rammed and sunk by British d. Ariel.	10- 3-15
157	U-29	sm.	840-980	Announced sunk by British. Loss admitted by German Admiralty	26- 3-15
	U-14	sm.	about 500	Sunk by British forces	8- 6-15
159	U-27	sm.	840-890	Announced by German Admiralty as missing	10- 8-15
	U-8 (new)	sm.	900	Interned in Holland	4-11-15
156	U-3	sm.	255	Rammed	9- 8-14
166	U-41	sm.	——	Sunk by gunfire	24- 9-15
166	U-20	sm.	——	Accidentally grounded and destroyed by crew	4-11-16
165	UC-5	sm.	200	Captured by British p. b.	27- 4-16
167	——	sm.	——	Captured by British in Mediterranean.	-11-16
169	——	sm.	——	Foundered off Norwegian coast	- 1-17
	Friedrich	ax. c.	8,865	Interned, Norfolk	7- 4-15
157	Kronprinz Wilhelm	ax. c.	14,705	Interned, Norfolk	29- 4-15
155	Berlin	ax. c.	17,324	Interned, Norway	16-11-14
	Patagonia	ax. c.	——	Seized by Argentina, violation of neutrality	16-11-14
	Eber	ax. c.	1,000	Interned, Bahia	- 9-14
161	Kormoran II	ax. c.	3,508	Interned, Guam	15-12-14
	Prince Adalbert	ax. c.	6,030	Captured by British c.	- 8-14
	Sudmark	ax. c.	5,113	Captured by British c.	15- 8-14
153	Kaiser Wilhelm der Grosse	ax. c.	13,952	Sunk by British c. Highflyer	27- 8-14
	Bethania	ax. c.	7,548	Captured by British c.	7- 9-14
	Spreewald	ax. c.	3,899	Captured by British c.	12- 9-14
153	Cap Trafalgar	ax. c.	18,710	Sunk by British ax. c. Carmania	14- 9-14
	Max Brock	ax. c.	4,579	Captured by British c.	- 9-14
	Graecia	ax. c.	2,753	Captured by English c.	10-10-14

GERMAN WARSHIP LOSSES—Continued

WHOLE NUMBER	NAME	TYPE	TONNAGE	REMARKS	DATE
	Markomannia	ax. c.	4,505	Sunk by British c. in Indian Ocean	16-10-14
	Navarra	ax. c.	5,794	Sunk by English ax. c. in Atlantic	11-11-14
	Eleonore Woermann	ax. c.	4,624	Sunk by Australian c. Australia	6- 1-15
158	Macedonia	ax. c.	4,347	Captured	30- 4-15
162	Greif	ax. c.	1,165	Sunk in battle, North Sea	29- 2-16
	Karnac	ax. tr.	4,437	Interned, Chile	-11-14
164	Hermann	ax. c.	3,000	Sunk by Russian destroyers	13- 6-16
153	Königin Luise	m. l.	2,163	Sunk by English d., North Sea	5- 8-14
158, 159	Albatross	m. l.	2,165	Sunk by Russians in Baltic. Reported raised and interned in Sweden	2- 7-15
159	Meteor	m. l.	3,613	Sunk by own crew after attempting to escape British forces, North Sea	8- 8-15
	Kingani	a. m. v.	——	Captured by the British on Lake Tanganyka	
	Locksun	n. t.	1,020	Interned, Honolulu	8-11-14
158	Ophelia	——	1,153	Captured by English c., North Sea. English claim vessel an ax. c., while Germany claims her a hospital ship	17-10-15

In addition to the above, there seems to be no doubt that a great number of German submarines have been destroyed around the British Isles and possibly also in the Mediterranean and near the Dardanelles.

AUSTRIAN WARSHIP LOSSES

153	Zenta	c.	2,264	Sunk by French fleet off Antivari	16- 8-14
155, 162	Kaiserin Elizabeth	c.	3,937	Sunk by her own crew at Tsing-Tao	7-11-14
161	—— (Novara type)	c.	3,384	Torpedoed	13- 1-16
	——	g. b.	——	Sunk, Adriatic	24- 5-15
	Temes	r. m.	433	Struck a mine and sank off Shabatz	23-10-14
161	Triglav	d.	787	Sunk by gunfire in Adriatic	29-12-15
161	Lika	d.	787	Sunk by mine in Adriatic	29-12-15
153	No. 19	t. b.	78	Struck by a mine and sank at entrance to Pola	18- 8-14
	——	t. b.	——	Sunk by mine in Adriatic	
	——	t. b.	——	Sunk by mine in Adriatic	
	——	sm.	——	Sunk by an Italian d.	17- 5-15
	U-18	sm.	685-860	Reported by France sunk by a French aeroplane, Adriatic	1- 7-15
159	U-12	sm.	——	Torpedoed and sunk by an Italian sm., upper Adriatic	12- 8-15
159	U-3	sm.	233-295	Sunk by French d. Bisson	13- 8-15
	——	sm.	——	Gunfire, French fleet	
	U-11	sm.	860	Sunk by aeroplane	1- 7-15
168	VT-12	sm.	——	Captured by Italy	- 1-17
168	VC-12	sm.	——	Captured by Italy	- 1-17
	——	tr.	5,000	Sunk by Italian warships, Dmazzo roads; loaded with munitions	———
	——	tr.	3,000	Sunk by Italian warships, Dmazzo roads; loaded with munitions	———
162	Elektra	h. s.	——	Torpedoed, Adriatic	18- 3-16
	Beethoven	tr. s.	——	Struck a mine and foundered	17-12-14

TURKISH WARSHIP LOSSES

155	Messudyeh	b.	10,000	Sunk by British sm. B-11, Dardanelles	14-12-14
	Kheyr-Ed-Din	b.	9,900	Torpedoed by British, Sea of Marmora	9- 8-15
158	Mejidieh	c.	3,330	Sunk by Russian mine, Gulf of Odessa	3- 4-15
161	Doruk Reis (type)	g. b.	502	Sunk by Russian d	10-12-15
158	Pelenk-I-Derih	g. b.	886	Sunk in Sea of Marmora, British sm.	24- 5-15
	Marmaris	g. b.	492	Sunk by British in Tigris River	1- 6-15
158, 159	Berk-i-Satvet (type)	g. b.	725	By mine near Dardanelles	29- 4-15
161	Issa Reis (type)	g. b.	500	Scuttled	1-11-14
	Malatia	g. b.	210	Officially reported by Petrograd as sunk in Black Sea	10-12-15
	Yadikar Milet	d.	610	Sunk by British sm.	- 5-15
159, 161	Yar Hissar	d.	284	Sunk by British sm., Sea of Marmora	6- 9-15
	Demir Hissar	t. b.	97	Stranded and interned at Chios	17- 4-15
157	Dhair Hissar	t. b.	97	Driven ashore, Greece	17- 4-15
	Nagara	tr.	——	Sunk by British sm., Sea of Marmora	- 5-15
158	—— (three)	tr.	——	Sunk by Russian warships; contained troops	———
160	Carmen	tr.	4,424	Sm., Marmora	24-10-15

TURKISH WARSHIP LOSSES—Continued.

WHOLE NUMBER	NAME	TYPE	TONNAGE	REMARKS	DATE
161	Rechid Pasha	tr.	8,000	Sm., Marmora	-12-15
	Bezemialen	tr.	——	Sunk, Black Sea	14-11-14
	Bachriachmar	tr.	——	Sunk, Black Sea	14-11-14
	Midiat Pasha	tr.	——	Sunk by sm.	14-11-14
166	Rodosto	tr.	6,000	Captured by Russian sm	-10-16

In addition to the above, other Turkish men-of-war may have been destroyed around the Dardanelles and in the Black Sea. Reports from England, Russia and Turkey in regard to these operations are so conflicting that it is impossible to accurately state what Turkish vessels have been destroyed, especially transports and supply ships.

INDEX OF WAR VESSEL LOSSES MENTIONED IN THIS NUMBER

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DIPLOMATIC NOTES

FROM FEBRUARY 18 TO MARCH 18

Prepared by A. F. WESTCOTT, PH. D., Instructor, U. S. Naval Academy

UNITED STATES ARMS MERCHANT VESSELS

PRESIDENT'S ADDRESS TO CONGRESS.—On February 26 President Wilson addressed Congress, requesting that he be given definite authorization "to supply our merchant vessels with defensive arms should that become necessary, and with the means of using them, and to employ any other instrumentalities or methods that may be necessary or adequate to protect our ships and our people in their legitimate and peaceful pursuits on the seas."

The President directed attention to the sinking of the American ships *Housatonic* and *Lyman M. Law*, and to the tying up of American shipping in home ports. He referred to his proposed policy as one of "armed neutrality." The address closed as follows:

"I believe that the people will be willing to trust me to act with restraint, with prudence, and in the true spirit of amity and good faith that they have themselves displayed throught these trying months; and it is in that belief that I request that you will authorize me to supply our merchant ships with defensive arms should that become necessary, and with the means of using them, and to employ any other instrumentalities or methods that may be necessary and adequate to protect our ships and our people in their legitimate and peaceful pursuits on the seas. I request also that you will grant me at the same time, along with the powers I ask, a sufficient credit to enable me to provide adequate means of protection where they are lacking, including adequate insurance against the present war risks.

"I have spoken of our commerce and of the legitimate errands of our people on the seas, but you will not be misled as to my main thought—the thought that lies beneath these phrases and gives them dignity and weight. It is not of material interest merely that we are thinking. It is, rather, of fundamental human rights, chief of all the right of life itself.

"I am thinking not only of the rights of Americans to go and come about their proper business by way of the sea, but also of something much deeper, much more fundamental than that. I am thinking of those rights of humanity without which there is no civilization. My theme is of those great principles of compassion and of protection which mankind has sought to throw about human lives, the lives of non-combatants, the lives of men who are peacefully at work keeping the industrial processes of the world quick and vital, the lives of women and children and of those who supply the labor which ministers to their sustenance. We are speaking of no selfish material rights, but of rights which our hearts support and whose foundation is that righteous passion for justice upon which all law, all structures alike of family, of state, and of mankind must rest, as upon the ultimate base of our existence and our liberty.

"I cannot imagine any man with American principles at his heart hesitating to defend these things."

ACTION OF CONGRESS.—A bill authorizing the President to supply American merchant ships with arms (without the authority to "use other instrumentalities") and providing for a $100,000,000 bond issue to insure

ships and cargoes, passed the House March 1 by a vote of 403 to 13, but as a result of opposition on the part of 11 members the bill failed to come to a vote in the Senate before the close of the 64th Congress. Seventy-six Senators signed a manifesto expressing their support of the bill. On the evening of March 4 the President issued a statement, deploring the Senate's failure to act, and pointing out the necessity of an alteration of Senate rules. On March 8 the Senate adopted a rule of cloture providing that on a two-thirds vote speeches should be limited to one hour.

DECISION REACHED.—On March 9 the President announced his conviction that he had the power to arm merchantmen and was free to exercise it at once, and on March 12 the decision to arm our vessels was conveyed to foreign governments in the following memorandum:

"In view of the announcement of the Imperial German Government on January 31, 1917, that all ships, those of neutrals included, met within certain zones of the high seas, would be sunk without any precaution taken for the safety of the persons on board, and without the exercise of visit and search, the government of the United States has determined to place upon all American merchant vessels sailing through the barred areas an armed guard for the protection of the vessels and the lives of the persons on board."

According to press statements, guns and gun-crews are to be provided by the navy. Merchant vessels are considered to retain the same status as if unarmed. In supplying guns, no distinction will be made between ships with contraband and ships with non-contraband cargoes.

SUBMARINE ATTACKS.—An act in direct violation of the *Sussex* pledge occurred in the sinking of the Cunarder *Laconia,* at 10.30 p. m., February 25. The attack occurred without warning, in a heavy sea. Among the 294 on board, there were six American passengers and 14 crew. Thirteen lives were lost, including two Americans, Mrs. Mary and Miss Elizabeth Hoy.

At 6 a. m. on March 12 the American steamer *Algonquin,* New York to London with foodstuffs, was fired upon without warning and sunk by shell fire from a German submarine. The attack, in which no lives were lost, occurred near the Scilly Isles.

GERMAN PROPOSAL TO MEXICO

On February 28 the Associated Press published a letter from Secretary Zimmerman, German Foreign Minister, to be transmitted to the German Minister in Mexico, von Eckhardt, outlining terms for an alliance with Mexico and suggesting Mexican mediation between Germany and Japan.

Upon the request of the Senate, Secretary Lansing on March 1 verified the authenticity of this letter, which is said to have been in the hands of the State Department at the time of the diplomatic rupture with Germany. The text follows:

[Authentic copy of the German Foreign Minister's note to the German Minister in Mexico.]

"BERLIN, January 19, 1917.

"On the 1st of February we intend to begin submarine warfare unrestricted. In spite of this, it is our intention to endeavor to keep neutral the United States of America.

"If this attempt is not successful, we propose an alliance on the following basis with Mexico: That we shall make war together and together make peace. We shall give general financial support, and it is understood that Mexico is to reconquer the lost territory in New Mexico, Texas, and Arizona. The details are left to you for settlement.

"You are instructed to inform the President of Mexico of the above in the greatest confidence as soon as it is certain that there will be an outbreak of war with the United States, and suggest that the President of Mexico, on his own initiative, should communicate with Japan suggesting adherence at once to this plan. At the same time, offer to mediate between Germany and Japan.

"Please call to the attention of the President of Mexico that the employment of ruthless submarine warfare now promises to compel England to make peace in a few months.

"ZIMMERMAN."

"APPAM" TO BRITISH OWNERS

A unanimous opinion of the Supreme Court on March 6 awarded to the English owners the liner *Appam* and her cargo, sent into Hampton Roads by the German raider *Möwe.—N. Y. Nation,* 15/3.

"YARROWDALE" MEN RELEASED

The 59 *Yarrowdale* prisoners held by Germany since December 31 were released and crossed the border into Switzerland on March 11. One seaman of French-Canadian family was detained. The men had been nominally free since February 16, but, according to the German statement, were held on account of the existence of infectious disease in their camp.

AUSTRIAN NOTE TO UNITED STATES

Ambassador Penfield on February 20 presented a formal request to Austria for an explanation of its attitude as to the pledges made after the *Ancona* sinking (note of December 21, 1915), in view of Austria's declarations of January 31 and February 16, 1917, joining with Germany in unrestricted submarine warfare.

To this request Austria replied in a note published March 7. After extended reference to the illegality of the British and Italian blockades, the note asserted: (1) that the legal requirement of warning to merchant vessels is fulfilled by a "general warning" issued by the belligerent state; (2) that armed vessels may be sunk without notice; (3) that neutrals may be warned not to travel or ship goods in vessels of belligerent nationality; (4) that neutrals forfeit all rights to protection by entering regions where warlike operations are taking place. In view of these considerations, the note contends that the *Ancona* pledges are not violated.

CHINA SEVERS RELATIONS WITH GERMANY

On March 14 China broke off diplomatic relations with Germany, handed the German minister his passports, and seized several German merchant vessels in the port of Shanghai, disembarking the crews and placing them under guard on shore. The pledges made by Germany, as published February 25, to respect Chinese life and property so far as possible without altering her submarine campaign, were considered unsatisfactory. The decision to break with Germany was reached by the Chinese Cabinet on March 4, but was delayed by President Li Yuan-Hung. On March 10 the President and Cabinet appeared before the House and requested approval of a severance of relations, which was given by a vote of 431 to 87.

WASHINGTON, March 2.—China desires to obtain the complete remission of the Boxer indemnities, which exceed $30,000,000 a year, and continue until 1940. If she entered the war, the part of the indemnity which otherwise would be paid to Austria and Germany could be repudiated. Information here indicates that the Entente already has agreed to postpone payments in case China begins hostilities, but does not corroborate Tientsin advices that France and Belgium, in behalf of the powers, have offered complete remission.

China also desires consent of the powers to increase her import duties which under the existing treaty not only cannot exceed 5 per cent ad valorem, but are based on the average prices of 1897, 1898, and 1899. The United States has long urged this on the other 16 signatory powers, but thus far only Japan and Great Britain have given full consent. Others have consented under varying extreme restrictions.

The Entente powers, on their part, are anxious to have China in the war, not only as a reservoir of men, but as the biggest open trade market after the war. Already, under agreement with local syndicates, headed by French and British residents, more than 100,000 Chinese laborers and agriculturists have gone to increase the Entente's man power, the great majority to France.—*N. Y. Times*, 3/3.

RUSSIAN REVOLUTION

On March 12–14 a rapid and almost bloodless revolution swept the Russian Czar off the throne and ended in the complete ascendancy of the provisional government set up by the Duma. At midnight on March 15 Emperor Nicholas abdicated on behalf of himself and his son, in favor of his younger brother, the Grand Duke Michael. On the following day the Grand Duke expressed his unwillingness to take control until the form of government was decided upon and the leader selected by the popular will manifested in a representative assembly. The revolution was directed against elements in the Russian Government which favored separate peace with Germany and opposed domestic reforms essential to vigorous prosecution of the war.

OFFICIAL STATEMENT

The following official report was issued in Petrograd on March 14:

"The population of Petrograd, incensed by the complete disorganization of transport services and of alimentation, have been irritated for a long time against the government and had become restless. The population held the government responsible for all its sufferings. The government,

expecting trouble, took measures on a large scale in order to maintain order, and, among other things, ordered the dissolution of the Council of the Empire and the Duma.

"The Duma, however, on March 11, decided not to accept the imperial ukase, but to continue its meetings. The Duma immediately instituted an executive committee, presided over by M. Rodzianko, president of the Duma. That committee declared itself to be a provisional government.

"The executive committee rested itself upon the population of the capital, which was in full revolution, and upon the army, completely united with the revolutionists. It arrested all the ministers and sent them to jail. The Duma declared that the Ministerial Cabinet no longer existed.

"To-day, on the third day of the revolution, the capital, where order is returning swiftly, is completely in the hands of the executive committee of the Duma and of the troops which garrisoned Petrograd, and numbered more than 30,000, which troops support the revolution. Deputy Engelhard, Colonel of the Great General Staff, has been appointed commander of Petrograd by the committee."

POLICY OF NEW GOVERNMENT.—In the new Cabinet established by the Duma, Prince Lvoff, a Zemstvo leader prominent in the Revolution of 1904–05, was made Premier, President of the Council, and Minister of the Interior—the latter an office of primary importance, formerly held to Protopopoff, the chief power in the old Cabinet. Prof. Paul Miliukoff, twice banished for his political opinions, was made Minister of Foreign Affairs. Pending the election of a constituent assembly, the Cabinet announced the following policies:

"First. An immediate general amnesty for all political and religious offences, including terrorist acts and military and agrarian offences.

"Second. Liberty of speech and of the press; freedom for alliances, unions, and strikes, with the extension of these liberties to military officials within the limits admitted by military requirements.

"Third. Abolition of all social, religious, and national restrictions.

"Fourth. To proceed forthwith to the preparation and convocation of a constitutional Assembly, based on universal suffrage, which will establish a governmental régime.

"Fifth. The substitution of the police by a national militia, with chiefs to be elected and responsible to the government.

"Sixth. Communal elections to be based on universal suffrage.

"Seventh. The troops which participated in the revolutionary movement will not be disarmed, but will remain in Petrograd.

"Eighth. While maintaining strict military discipline for troops on active service, it is desirable to abrogate for soldiers all restrictions in the enjoyment of social rights accorded other citizens.

"The provisional government desires to add that it has no intention to profit by the circumstances of the war to delay the realization of the measures of reform above mentioned."—*N. Y. Times*, 17/3.

REFORMS PLEDGED BY BETHMANN HOLLWEG

A first reflection abroad of the Russian upheaval is seen in Chancellor von Bethmann Hollweg's stirring speech before the Prussian Diet on March 14, in which he pledged the democratization of Germany by thorough-going, post-bellum reforms. The effect of the speech was to patch up the weakening political truce between Conservative and Liberal elements in Germany.

CABINET CHANGES IN FRANCE

On March 14 Gen. Lyautey resigned as French War Minister, following a clash with the Chamber of Deputies arising from ignorance of parliamentary procedure. Reports of March 17 indicated a reorganization of the Cabinet, in which departments now combined under one minister would be restored to their former status; but on March 18 all members of the Briand Ministry resigned. A new Cabinet, with twelve members and an Under Secretary for Aviation, was formed March 19 by M. Alexandre Ribot, Minister of Finance in the Briand Cabinet.

REVIEW OF BOOKS
ON
SUBJECTS OF PROFESSIONAL INTEREST

"The *Ayesha:* Being the Adventures of the Landing Squad of the *Emden.*" By Kapitän-Lieutenant Von Mücke. Translated by Helene S. White. 223 pp., illustrated. (Boston, Mass.: Ritter and Company.)

This true sea tale, which appeared in the Institute PROCEEDINGS December, 1916–February, 1917, has been published in book form by Ritter and Company, Boston.

The record of the adventures of Von Mücke and his high-spirited band deserve a place between fiction and history on the book shelf, and doubtless many of our readers will be glad to obtain it in separate form for themselves or for their friends. J. W. G.

"The Pangerman Plot Unmasked." By André Chéradame. $1.25. (New York: Charles Scribner's Sons, 1917.)

The thesis of M. Chéradame's book, expressed briefly, is nothing less than this: For the past 22 years, or, to be exact, since 1895, Pan-Germanism has been not only a doctrine but a plot, this plot "of purely Prussian origin," says the author, "has developed in a cumulative way, until, in 1911, it took more or less final shape, and was laid down in the book of Otto Tannenberg: *"Grossdeutschland, die Arbeit des 20ten Jahrhunderts"* (Bruno Volger, Leipzig-Gohlis, 1911). This Pan-German plan of 1911 aimed at "annexing all the various regions, irrespective of race or language, of which the possession is deemed useful to the power of the Hohenzollerns." These regions include three categories, as follows: (1) Austria-Hungary, Belgium, Holland, northern France (down to a line drawn from the mouth of the Somme to the Swiss border below Belfort), western Russia (Russian Poland, Esthonia, Livonia, Courland, Kovno, Vilna, Grodno, and part of Volhynia). (2) The vassalage of all the Balkan States (Serbia, Bulgaria, Roumania, Montenegro, Albania, and Greece). (3) The political and military seizure, and the economic control of Turkey, European and Asiatic, "to the Persian Gulf." (4) The later absorption of Egypt and Persia.

Ultimately, moreover, according to the author, the possession of this immense empire, and the control of its wealth and its vast military man-power, would enable Germany to absorb colonies or spheres of influence—so the plan was—in Africa, in China, in Mexico, and in South America.

But this is not the only thesis—or, rather, there is contained within this the following thesis: Germany's most dangerous move is "the formidable peace-trap of the 'drawn war,'" by which the Allies and the world in

general will be lulled into a false sense of security, should an inconclusive peace be accepted. In other words, Germany will actually win the war, and gain strength enough to carry out her gigantic plot in the future, if by the terms of peace she is permitted to retain her control over Austria-Hungary, and, beneath the surface, her control of the Balkans and Turkey.

So much for the essence of the book. In addition, three points are worthy of note. First, there is the introduction by Lord Cromer. Secondly, there is the fact that M. Chéradame has studied his great subject, the world over, for 23 years, and that he predicted a great conflict to carry out the Pan-German plan, some years before the war broke out—in 1908, for instance, in an address at Edinburgh. Thirdly, there is the quotation from documents, press articles, books, and the utterances of statesmen, in Germany.

Now, this book is either for the most part true, or it is for the most part false. In such a question, there is no half-way truth, no possibility of avoiding a fairly clean-cut issue. If it be on the whole false, it is interesting reading. If it be on the whole true, then one would find it difficult to overestimate its importance. H. C. Washburn.

"At The War." By Lord Northcliffe. 355 pp. $2.00. (New York: Geo. H. Doran Co.)

Few of us in this country realize the enormous power of Alfred Harmsworth, Baron Northcliffe, and none but Mr. Hearst in his wildest moments ever dreamed of rivalling it in America. "What England thinks," complains Norman Angell, "is controlled by one man"; another has declared that "no man nor government can hold office, nor policy succeed in England save by the grace of Lord Northcliffe." In fact, certain Englishmen who object to the ruthless fashion in which the Northcliffe papers behead cabinet ministers, Lords of the Admiralty, and generalissimos, refer to these journals as the "lynch press."

It is, therefore, with a feeling of awe that one opens a volume written by this absolute monarch of the newspaper world. "At the War" was published at the request of the British Red Cross Society and Order of St. John, to which all profits from the sale of the book are devoted by author and publisher. It proves to be a collection of extracts from Lord Northcliffe's cablegrams, telegrams, letters, and articles, much of it mere scraps pieced together by the simple expedient of a row of asterisks. From the first page the reader is conscious of a feeling of disillusionment, and the feeling grows as one reads further. This giant who builds up and pulls down governments at his own sweet will proves to be as naive and jingoistic as the delightfully ferocious old lady whom we meet in *Punch*. His opening sentence, referring to "our dear soldier boys," suggests the tone of the whole book. One chapter for instance, is entitled, "The Women are Splendid." The following are typical pearls of Northcliffian thought: "A million is a very large number . . . . The faces of our soldiers, unlike those of the Germans, are full of individuality . . . . It is the way with the British soldier; for, within the breast of a hero he cherishes ever the heart of a little child."

Sentimental jingoism, however, is not the author's worst failing as a writer on the war. Probably no other civilian ever had the opportunities afforded Lord Northcliffe for seeing the war at first hand on both the French and the Italian fronts, and yet he seems to have had eyes for only the superficial details. His glimpses of neutral Switzerland and Spain are rather interesting, especially as they reveal the sway of German sentiment in those countries.

In deference to the British Red Cross it may be said that this book has an interest of a certain kind. If one enjoys gossipy details about when General Haig, or General Joffre, goes to bed and sits down to breakfast, or about the pleasant twinkle in General Cadorna's eye, or the club that Lady Dudley founded for subalterns at Boulogne, or how an economical government has learned to make over worn-out military boots into shoe-strings, this is the book. But if the reader is looking for a vision of the great spiritual facts of the war, or a graphic portrayal of the scenes and the actors in the great tragedy, he must look elsewhere.

W. O. S.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-fourth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing."

Sec. 8. The annual dues for regular and associate members shall be two dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be thirty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.00. Single copies, by purchase, 30 cents; issues preceding January, 1917, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1918

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award for the prize will be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1918. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the PROCEEDINGS of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the PROCEEDINGS of the Institute, after it leaves the hands of the Board.

4. If, in the opinion of the Board of Control, the best essay presented is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention" or such other distinction as the Board may decide.

5. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

6. An essay not having received honorable mention may be published also, at the discretion of the Board of Control, but only with the consent of the author.

7. The essay is limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

8. It is requested that all essays be submitted typewritten and in duplicate, if practicable; essays submitted written in longhand and in single copy will, however, receive equal consideration.

9. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

J. W. GREENSLADE,
Lieut. Commander, U. S. N., Secretary and Treasurer

PRIZE ESSAY TOPICS

SUGGESTED AT THE INVITATION OF THE BOARD OF CONTROL

BY

THE PRESIDENT OF THE NAVAL INSTITUTE, THE SUPERINTENDENT OF THE NAVAL ACADEMY, THE PRESIDENT OF THE NAVAL WAR COLLEGE, AND THE COMMANDERS-IN-CHIEF OF THE ATLANTIC, PACIFIC AND ASIATIC FLEETS.

"The Mutual Relations of Gunnery and Tactics."

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-Warsmen: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

"A Personnel Reserve for the Naval Service."

"Value of Speed as an Offensive Element in Battleship Strategy and Tactics, as Compared with Armor."